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ORGANIZATION AND CROP PRODUCTION PRACTICES ON GRAIN FARMS IN SELECTED AREAS OF THE NORTHERN GREAT PLAINS

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INTRODUCTION

Successful farm planning necessitates a knowledge of the size and organization of farms and an estimate of the amount of time required to perform the field operations. Because of the need for such information, this study of farm organization and farm practice was made.

A survey of approximately 1240 farms in the major wheat producing areas of the Northern Great Plains, and of approximately 400 farms in the Pacific Northwest was concluded in June 1934. The farming areas surveyed in the Northern Great Plains are shown in figure 1. 1/ The number of farm records secured in each State and county, by type-of-farming areas, is shown in appendix table 25.

As the study aimed to show the methods of growing and handling crops, particularly wheat, the sample of farms may show a larger acreage of wheat and a higher proportion of the land in crops than would a county average. As no particular effort was made for any other selection, it is believed that the records obtained are typical of grain farms in the type-of-farming areas studied.

In certain sections of the Northern Great Plains, particularly in western North Dakota, eastern Montana, and in many areas of South Dakota, conditions of extreme drought prevailed in 1933, and very little harvest was reported in these drought areas. In these areas, therefore, the practices employed in a normal season, rather than those reported in 1933, are shown in this report.

The present report is the sixth in a series of Bureau of Agricultural Economics publications dealing with grain farms in the Northern Great Plains and in the Pacific Northwest. Previous publications are:

(1) Tillage, Planting and Harvesting Equipment on Grain Farms and Rates of Doing Field Work with these Implements when Drawn with Horse and with Tractor Power (Northern Great Plains and Pacific Northwest, 1933).

(2) Utilization of Tractors and Cost of Tractor Power on Grain Farms (Northern Great Plains and Pacific Northwest, 1933).

1/ Most of the areas surveyed lie within the boundaries of the region known as the Northern Great Plains Physiographic Province. Data were obtained from a few adjoining areas which, because of similarities in farm practice, have been considered in this report as a part of the Plains region.

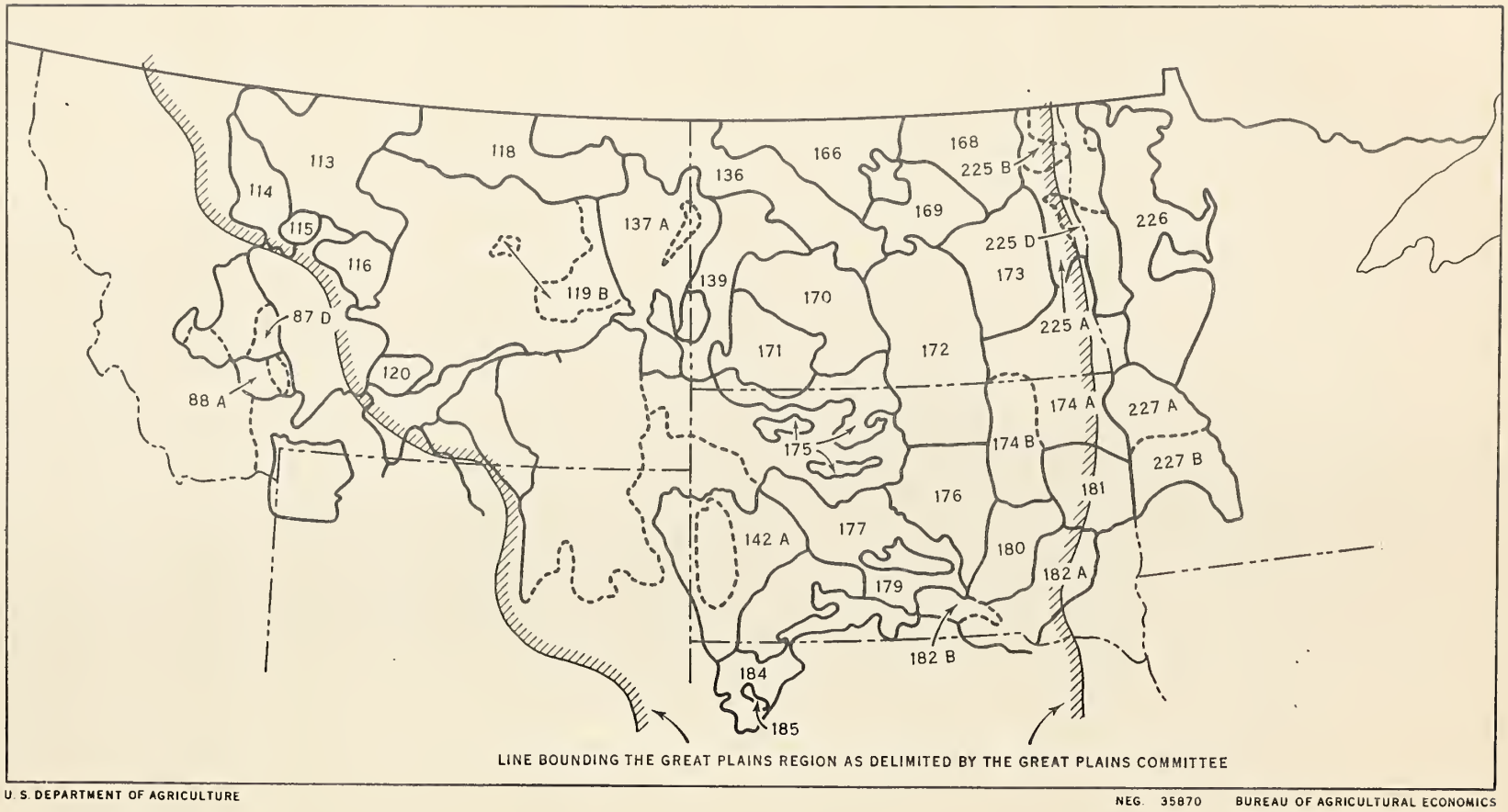

Figure 1. - Type-of-farming areas where study was made of the organization and crop production practices on grain farms (areas are those outlined in United States Department of Commerce, Bureau of the Census Bulletin "Types of Farming in the United States, 1930.")

(3) Utilization of Combined Harvester-Threshers and Cost of Harvesting Small Grains with a Combine (Northern Great Plains and Pacific Northwest, 1933).

(4) Cost of Operating Farm Motor Trucks on Grain Farms (Northern Great Plains and Pacific Northwest, 1933).

(5) Organization and Crop Production Practices on Grain Farms in Selected Areas of the Pacific Northwest.

The present report deals with the major wheat producing areas of the Northern Great Plains. It discusses (1) the physical and economic factors affecting agricultural production in the region; (2) wheat yields and frequency of damage to wheat from different causes; (3) the farm organization from the standpoint of size of farm, livestock kept, and the place of the different crops in the cropping system; (4) the practices employed in the production of different crops; (5) the duty of farm machinery; and (6) the labor and power involved in the production of crops.

The discussion is not concerned with the choice and combination of enterprises, but rather with the methods of production. An effort has been made to present the data in a way that will be of greatest use to those dealing with the problems of agricultural adjustment in the region, and an example is given of the application of the basic data to individual farms.

An inquiry as of June 1939 indicates that since this study was made, agricultural machinery developments have influenced certain aspects of the farm economy as portrayed by the farms under consideration.

There has been an appreciable increase in the use of farm tractors, especially in the more easterly areas of the region. As the acceptance of pneumatic tires has been unusually favorable it is probable that new tractors of the high-wheel type will be largely those mounted on rubber tires.

In the past 2 or 3 years small combines mounted on rubber have been used quite extensively in certain of the more easterly areas of North Dakota where formerly most of the grain was cut with the binder and threshed in a stationary separator. Aside from the use of the small combine, there has been no appreciable change in harvesting implements.

At different points in the report new machinery developments that have modified practices to any marked extent have been considered.

PHYSICAL FACTORS: THEIR RELATION TO LAND USE AND CROP YIELDS

As climate and other physical characteristics of a region are so closely related to land use and crop yields, an examination of these factors helps to give a better understanding of the status of the agriculture of the region.

Topography and Elevation

Topographic features of the arable lands favor large-scale farming operations in a considerable portion of the Northern Great Plains. Surface features of North Dakota and South Dakota westward to the Missouri River are characterized by undulating to gently rolling plains except in the Red River Valley of North Dakota which is generally level. The greater part of the area west and south of the Missouri River in the Dakotas is rolling to hilly. The Black Hills and the "Bad Lands" in southwestern South Dakota and the "Bad Lands" chiefly bordering the Little Missouri River in western North Dakota, are too rough to be generally suitable for crop production and are utilized chiefly for grazing purposes.

Approximately the western one-third of Montana lies in the Rocky Mountain region and the eastern two-thirds in the Northern Great Plains. The Plains area is characterized by undulating to gently rolling surface features broken by the stream courses of the Missouri and Yellowstone Rivers and their tributaries.

From east to west across the Northern Plains the elevation increases gradually. Most of the Red River Valley is less than 1000 feet in elevation, while at Dickinson in southwestern North Dakota the elevation is approximately 2500 feet above sea level. The elevation in Montana at Sidney, near the North Dakota line is slightly more than 3000 feet, while at Agricultural College in southwestern Montana it is nearly 5000 feet (fig. 2). 2/ Differences in elevation have an appreciable influence on temperature, dates of killing frosts and length of growing season, which in turn have their effect on crop production, particularly corn.

Soils

Where sufficient moisture is present soils of the Northern Great Plains are for the most part highly productive. In that part of the region north of the Missouri River in Montana and east of the Missouri in North Dakota and in South Dakota, the soils in general are the result of glacial accumulations, while the soils in other parts of the region are chiefly of residual origin.

In texture these soils vary from heavy clays to sands. In most areas fertile soils of good texture are available for cultivation.

These soils were, for the most part, developed under a grass cover. There are a series of soil belts running north and south. The most easterly of these soil belts are characterized by dark soils. From east to west the soils become lighter in color, as the density of the grass cover lessens and the rainfall decreases. The dark color of the soil is due to an accumulation of organic matter derived from the decay of vegetable matter. 3/

2/ From reports of United States Weather Bureau Stations.
3/ Note source - Atlas of American Agriculture. Part III, p. 72.

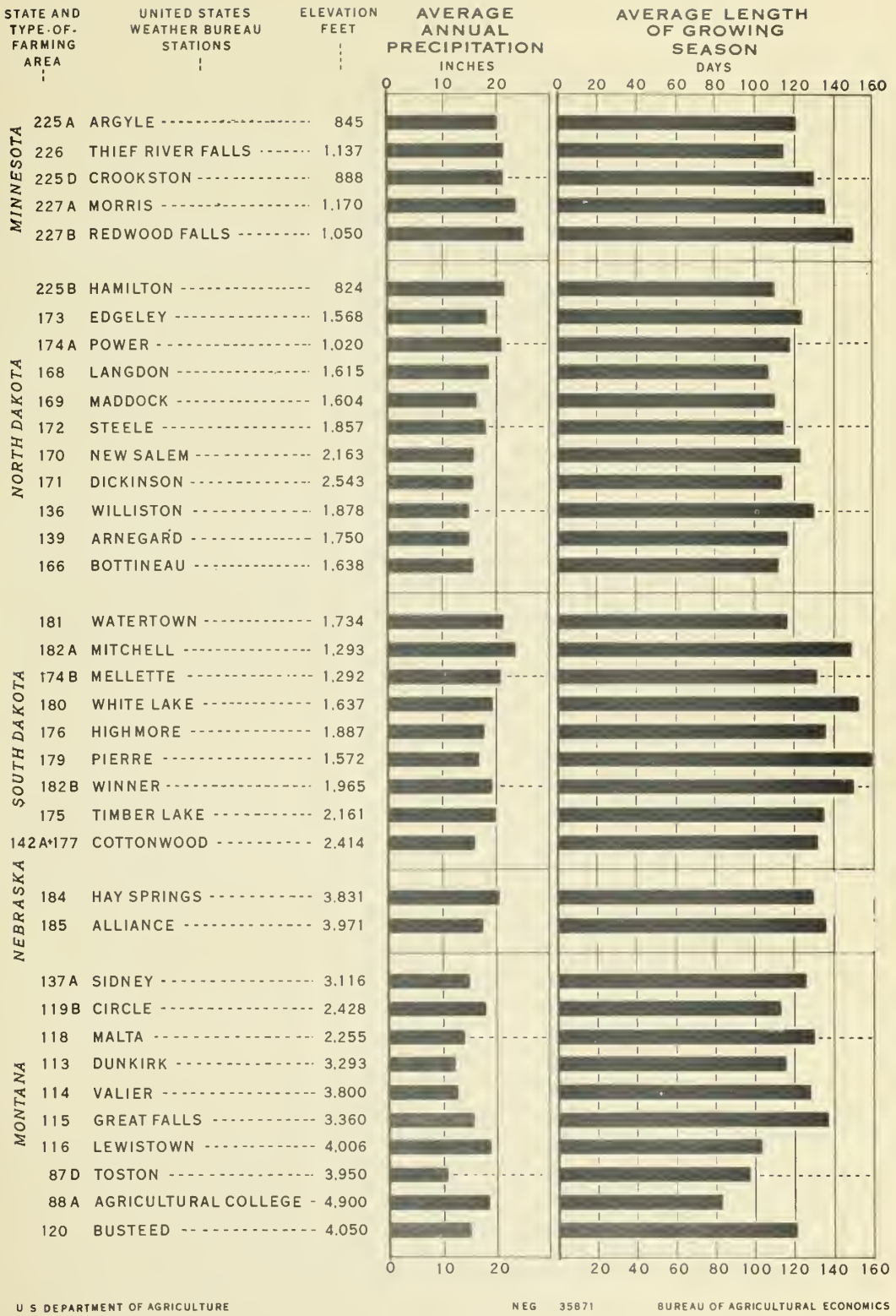

Figure. 2. - Elevation, precipitation, and length of growing season at selected United States Weather Bureau Stations

Climate

The climate of the region is characterized by rather wide extremes of temperature, a dry atmosphere, much sunshine and a moderate to low rainfall.

The temperature during the summer months may reach 100 degrees or more. During periods of prolonged high temperature, the increased evaporation seriously depletes the moisture supply and causes severe damage to crops. In addition, the characteristic high wind velocity heightens the losses due to high temperatures and evaporation. Furthermore the ground may become frozen early, and if the winter is severe, may remain frozen, so that subsequent rains run off without supplying moisture to the soil. On the other hand, an early and plentiful blanket of snow may protect and moisten the soil. A favorable factor which results in the rapid growth of plants is the long hours of sunshine, especially during the growing season.

Climatic conditions, as portrayed by records of annual precipitation and length of growing season at selected United States Weather Bureau Stations, are shown in figure 2. Annual precipitation and length of growing season are much more favorable in the eastern areas than in other parts of the region. The average annual precipitation ranges from less than 12 inches in south-central Montana to approximately 25 inches in southwestern Minnesota. It does not exceed 20 inches except in the eastern parts of the region. The growing season is more than 150 days in the southeastern areas, whereas in certain areas of Montana it is less than 100 days. A favorable factor is that the greatest precipitation occurs in May, June, and July, the critical period in plant growth for small grain crops. In years of average or better than average annual precipitation and where the seasonal distribution is favorable it is usually adequate to produce a satisfactory yield of the drought resistant small grains. The southeastern part of the region, however, is the only area where rainfall and length of growing season are usually adequate to produce a satisfactory crop of corn for grain.

Variations in annual precipitation from year to year, together with fluctuations in its seasonal distribution are large factors in determining whether there will be a satisfactory yield or a crop failure. The Weather Bureau record at Williston, northwestern North Dakota, may be taken to illustrate the variations in the annual and seasonal distribution of rainfall. At this station there have been a number of years of low rainfall as well as an abnormal distribution during the critical period of the growing season, May, June and July. Over a 42 year period the average annual rainfall has been 14.8 inches but in 12 of these years it has been less than 13 inches. Approximately 67 percent of the rainfall normally comes during the growing season from May to September and 50 percent occurs during the critical period, May, June and July. Over the 15-year period from January 1921 to December 1934, the variation in May has been from .47 to 4.69 inches; in June from 1.24 to 6.98 inches; and in July from .5 to 6.07 inches.

WHEAT YIELDS

As a measure of the possibilities of different areas for wheat production, not only the long time average yield of wheat but the frequency of occurrence of good and poor crops are of importance. Long time average wheat yields of farmers interviewed, calculated from their reports of good and poor yields, are shown in table 1. These yields are somewhat higher than county averages and perhaps more nearly represent the production possibilities of the better farms and farmers than of the average.

Farmers' estimates indicate less variability in wheat yields in western Minnesota and eastern North Dakota, than in most other areas. Farmers in these areas reported few crop failures and moderately high yields. A productive soil and the practice of growing wheat in west-central Montana on summer fallowed land is a factor in the relatively high yields of wheat reported for this area.

The causes of damage to wheat yields, as reported by farmers interviewed, are given in table 2. They reported that deficient moisture had reduced wheat yields more than any other one cause. While drought was the greatest single factor influencing wheat yields, this cause was of lesser importance in western Minnesota and eastern North Dakota than in the other areas. According to farmers' estimates, total loss of the wheat crop in these areas, because of drought, varied from 0 to approximately 4 percent of the time that they had been producing wheat, while in areas represented in western North Dakota this variation was from approximately 6 to 11 percent of the time.

Plant disease, mainly black stem rust, ranked second as a factor in reducing wheat yields in western Minnesota and in the more easterly areas of North Dakota and South Dakota. In the higher and drier areas, such as the western Dakotas and Montana, the damage from rust was not particularly severe.

Grasshoppers and hail caused some damage in all areas. Hail damage is generally of a local nature. It may cause damage in a certain location one year, and in another locality in another year.

ORGANIZATION OF FARMS STUDIED

Because of the influence of large power equipment, the farms have been classified on the basis of those with and those without tractors.

Size of Farms and Division of Farm Area of Farms with and Without Tractors

In this region topography plays a leading part in determining the relative acreage of permanent pasture and cropland on dry land grain farms. In western Minnesota and in about the eastern half of the Dakotas the proportion of the farm area in cultivation was greater than in the western

Table 1. - Average yield per acre of wheat calculated from estimates by farmers of yields that were good, medium, poor or failure and frequency of occurrence, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Period	Yields obtained per acre (bushels)				Proportion of years yields were obtained (percent)				Average yield per acre (bushels)
			Good	Medium	Poor	Failure	Good	Medium	Poor	Failure	
	Number	Years									
Minnesota											
225A	42	13	24.0	16.6	8.8	.3	16.9	46.9	32.1	4.1	14.9
226	9	14	24.9	14.8	8.4	-	9.2	52.3	36.2	2.3	13.4
225D	18	14	23.7	17.4	9.1	-	10.7	54.6	31.4	3.3	15.4
227A	23	15	19.9	14.2	7.8	.2	14.6	52.0	27.8	5.6	12.1
227B	27	11	23.4	16.4	8.1	.2	18.7	54.1	24.1	3.1	15.7
North Dakota											
225B	10	15	21.9	14.8	9.4	-	19.2	43.0	35.9	1.9	13.6
173	32	18	18.7	11.3	5.8	1.2	21.7	48.5	25.3	4.5	10.8
174A	49	12	20.6	14.5	8.3	.3	16.1	42.4	31.9	9.6	12.9
168	39	15	21.6	14.9	7.4	.1	16.0	43.0	37.6	3.4	13.0
169	35	18	17.4	10.6	5.6	1.2	22.7	53.0	20.7	3.6	10.7
172	51	17	17.0	9.8	4.9	1.0	20.7	40.2	28.2	10.9	8.7
170	37	19	17.5	9.9	5.1	1.6	26.8	40.2	22.1	10.9	9.6
171	45	13	16.4	8.6	4.2	.8	20.9	37.9	31.9	9.3	8.4
136	68	18	18.1	9.5	4.8	1.1	21.2	39.1	27.7	12.0	8.5
139	18	23	22.9	10.6	2.4	.8	20.1	35.8	33.7	10.4	10.3
166	39	14	20.0	13.2	6.1	-	11.8	36.2	38.1	13.9	9.3
South Dakota											
181	31	13	21.9	13.9	7.6	.5	15.2	35.7	33.9	15.2	10.7
182A	23	17	19.2	13.2	4.8	-	16.4	41.7	20.1	21.8	9.6
174B	31	14	19.9	12.0	6.3	.3	16.6	34.5	33.8	15.1	9.6
180	27	16	19.7	13.4	6.2	.5	18.5	48.6	21.3	11.6	10.3
176	40	13	20.8	13.3	5.7	.7	18.8	34.7	26.3	20.2	10.1
179	18	12	24.5	13.5	6.1	.6	18.7	44.4	24.3	12.6	12.1
182B	26	16	23.1	14.4	6.8	.2	13.6	42.3	23.9	20.2	10.9
175	29	12	20.2	11.4	5.3	1.0	17.0	42.3	24.0	16.7	9.6
142A and 177	27	16	25.1	13.7	6.5	1.4	23.2	36.2	24.2	16.4	12.8
Nebraska											
184	46	12	25.9	15.5	6.9	.7	22.1	37.9	24.0	16.0	12.9
185	21	13	24.6	14.3	6.9	1.0	25.7	43.8	19.5	11.0	14.4
Montana											
137A	33	16	17.3	9.0	4.6	1.4	21.3	30.9	32.6	15.2	8.0
119B	22	18	19.9	10.6	5.4	.5	23.5	40.7	28.3	7.5	10.7
118	28	18	19.8	11.0	5.5	.9	24.8	35.9	28.6	10.7	10.3
113	49	17	19.4	10.1	5.1	1.4	24.0	33.7	26.0	16.3	9.0
114	25	15	25.5	14.6	7.5	1.6	30.1	39.9	21.5	8.5	14.8
115	26	13	30.2	16.5	9.5	.8	34.6	30.6	18.0	10.8	16.8
116	40	14	24.7	14.0	6.2	.9	25.3	43.6	25.3	5.8	13.4
87D	15	18	24.5	14.1	7.7	.9	38.9	24.8	22.9	13.4	14.6
88A	35	15	28.9	19.4	9.7	1.3	31.9	44.5	21.2	2.4	19.5
120	20	16	25.2	13.6	6.8	.6	26.0	34.1	28.3	11.6	12.5

Table 2.-Proportion of years that total, partial, and no damage to wheat yields from different causes, was reported by farmers interviewed, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Period	Total				Partial				No damage			
			Drought	Hail	Insect pests	Plant disease	Drought	Hail	Insect pests	Plant disease	Drought	Hail	Insect pests	Plant disease
	Number	Years	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Minnesota														
225A	42	13	.9	1.6	-	1.1	15.4	5.6	9.0	14.2	83.7	92.8	91.0	84.7
226	9	14	-	2.3	-	-	22.3	5.4	11.5	13.1	77.7	92.3	88.5	86.9
225D	18	14	1.1	.7	-	1.5	12.9	4.3	7.0	14.4	86.0	94.5	93.0	84.1
227A	23	15	4.4	1.2	.3	.6	13.4	3.8	1.5	13.7	82.2	95.0	98.2	85.7
227B	27	11	2.0	1.0	-	-	15.0	8.9	1.2	14.6	83.0	90.1	98.8	85.4
North Dakota														
225B	10	15	.7	-	-	.7	24.3	5.4	18.9	17.6	75.0	94.6	81.1	81.7
173	32	18	2.7	1.5	-	.7	27.8	6.0	6.4	18.0	69.5	92.5	93.6	81.3
174A	49	12	8.3	1.5	.5	1.0	22.8	3.6	2.3	14.3	68.9	94.9	97.2	84.7
168	39	15	2.0	.9	.9	.9	26.7	6.3	13.1	14.8	71.3	92.8	86.0	84.3
169	35	18	3.1	.3	-	.5	20.6	7.5	7.9	11.2	76.3	92.2	92.1	88.3
172	51	17	6.8	3.4	2.6	1.4	31.5	10.4	11.1	13.1	61.7	86.2	86.3	85.5
170	37	19	5.2	3.2	-	1.9	24.2	6.9	5.3	9.0	69.6	89.9	94.7	89.1
171	45	13	6.7	2.0	.2	.7	29.2	17.2	12.0	4.2	64.1	80.8	87.8	95.1
136	68	18	7.8	2.5	.6	1.9	34.8	9.0	5.5	5.4	57.4	88.5	93.9	92.7
139	18	23	6.5	1.7	.2	1.9	50.4	8.0	8.7	10.4	43.1	90.3	91.1	87.7
166	39	14	11.2	2.2	4.9	.9	29.1	7.0	13.9	6.9	59.7	90.8	81.2	92.2
South Dakota														
181	31	13	11.3	.5	3.5	4.3	28.1	4.0	8.1	10.3	60.6	95.5	88.4	85.4
182A	23	17	13.4	4.9	.5	3.9	20.8	5.6	3.9	17.2	65.8	89.5	95.6	78.9
174B	31	14	13.3	1.9	1.2	.9	32.9	8.4	2.6	16.1	53.8	89.7	96.2	83.0
180	27	16	11.3	2.8	4.7	.9	29.6	5.9	9.2	7.3	59.1	91.3	86.1	91.8
176	40	13	18.0	2.8	10.7	1.2	35.3	8.1	12.9	10.9	46.7	89.1	76.4	87.9
179	18	12	12.1	.9	9.8	1.4	36.0	8.0	20.1	7.0	51.9	91.1	70.1	91.6
182B	26	16	11.3	3.2	10.3	1.0	31.9	7.4	7.1	20.1	56.8	89.4	82.6	78.9
175	29	12	13.7	2.7	1.8	.6	33.5	15.5	11.9	13.1	52.8	81.8	86.3	86.3
142A & 177	27	16	9.8	3.9	1.6	1.4	36.9	13.7	3.4	8.4	53.3	82.4	95.0	90.2
Nebraska														
184	46	12	10.2	7.3	1.8	1.6	30.0	18.2	6.1	8.2	59.8	74.5	92.1	90.2
185	21	13	6.1	4.0	-	.7	24.9	18.0	4.7	8.0	69.0	78.0	95.3	31.3
Montana														
137A	33	16	8.3	5.0	.4	1.7	38.9	6.6	3.7	2.5	52.8	88.4	95.9	95.8
119B	22	18	7.0	.6	.3	-	29.6	7.4	6.2	.8	63.4	92.0	93.5	99.2
118	28	18	7.9	2.0	-	.4	43.3	4.8	3.8	3.0	48.8	93.2	96.2	96.6
113	49	17	12.0	1.6	2.7	-	37.6	7.4	5.2	1.5	50.4	91.0	92.1	98.5
114	25	15	5.3	2.2	.5	-	28.2	9.4	6.5	1.0	66.5	88.4	93.0	99.0
115	26	13	3.2	7.6	1.2	-	28.2	10.2	6.4	1.2	68.6	82.2	92.4	98.8
116	40	14	3.1	2.6	.2	-	32.5	11.4	6.7	.7	64.4	86.9	93.1	99.3
87D	15	18	9.7	1.4	.3	-	28.7	5.4	1.1	.3	61.6	93.2	98.6	99.7
88A	35	15	1.0	1.3	.2	-	26.6	11.5	2.0	.7	72.4	87.2	97.8	99.3
120	20	16	8.4	3.2	-	-	30.2	20.3	3.9	.3	61.4	76.5	96.1	99.7

Dakotas and in certain areas of Montana, where the land is less suited to crop production, because of less productive soil and the tendency toward a more rolling to hilly toeography.

The proportion of the total farm land in cultivation (cropland and summer fallow land) for both farms with and without tractors was quite similar for a given area. For all farms with tractors, cropland represented 52 percent; summer fallow 9 percent; and permanent pasture and other land 39 percent of the total farm area. For all farms without tractors the division was: Cropland 48 percent; summer fallow 4 percent; and permanent pasture and other land 48 percent (figs. 3 and 4).

The proportion of farms in each size group, based on crop acreage per farm, for those with and without tractors is shown in figures 5 and 6. In all areas the crop acreage on farms where tractors were used exceeded that on farms using only horses for field work. With the tendency toward the greater use of tractors in areas of large wheat farms, the crop acres per farm average 120 percent larger on farms with than without tractors. Approximately 70 percent of the surveyed farms with tractors were under 561 acres; 50 percent were under 401 acres; and 18 percent were under 241 acres.

In contrast with the general tendency for relatively large farms to have tractors is the tendency for small farms to be without tractors. Farms without tractors tend to be in the 240 and under and in the 241-400 acre size groups, with the greater number in the smaller group. Approximately 97 percent of all farms without tractors were under 561 acres; 91 percent were under 401 acres; and 58 percent were under 241 acres.

Tractors were used in all of the grain producing areas in the Northern Great Plains. They were the chief source of power for field work on many of the larger farms in the more westerly areas. On the smaller general farms in the eastern areas of the region, horses were used for certain kinds of farm work, and on many of these farms they were the only source of power for field work.

The proportion of the farms with tractors, according to this sample, varied from 25 percent in a general farming area of western Minnesota to 100 percent in one of the wheat areas of Montana.

In western Minnesota and in the eastern part of North Dakota and South Dakota about 50 percent of the farms had tractors; in the central and western parts of the Dakotas about 70 percent; and in Montana and northwestern Nebraska about 80 percent were farms with tractors. For the entire region 69 percent of the farmers enumerated had tractors.

Distribution of Tractors of Different Types and Sizes According to Crop Area per Farm

The number of tractors by type and size, according to acreage in crops on farms reporting tractors, is given in table 3. In this region there did not appear to be any decided relationship between crop acreage per farm and size of tractor. There was some tendency for the larger tractors, especially

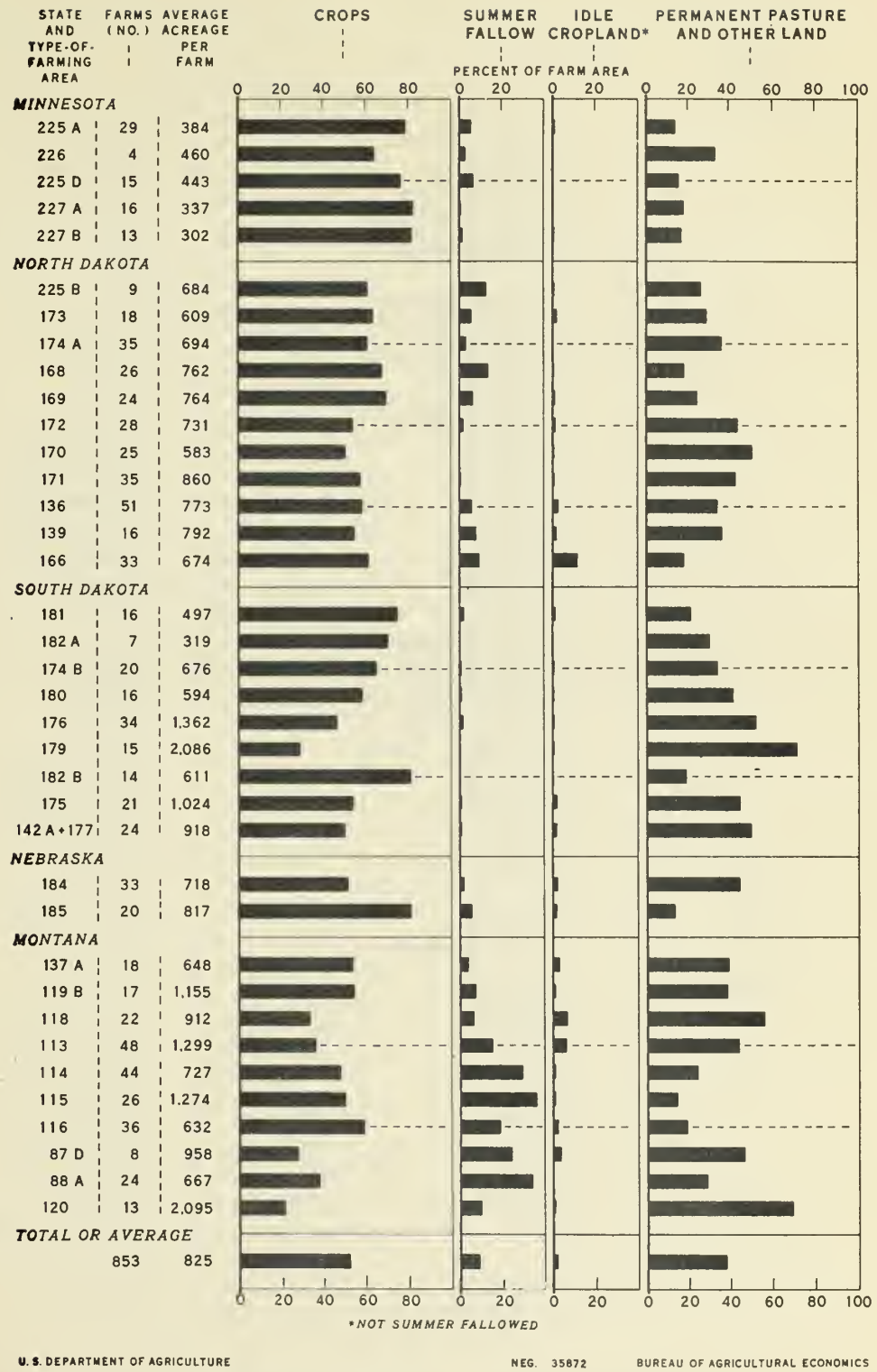

Figure 3. - Farms with tractors: Proportion of farm area in crops, summer fallow, permanent pasture and other land for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

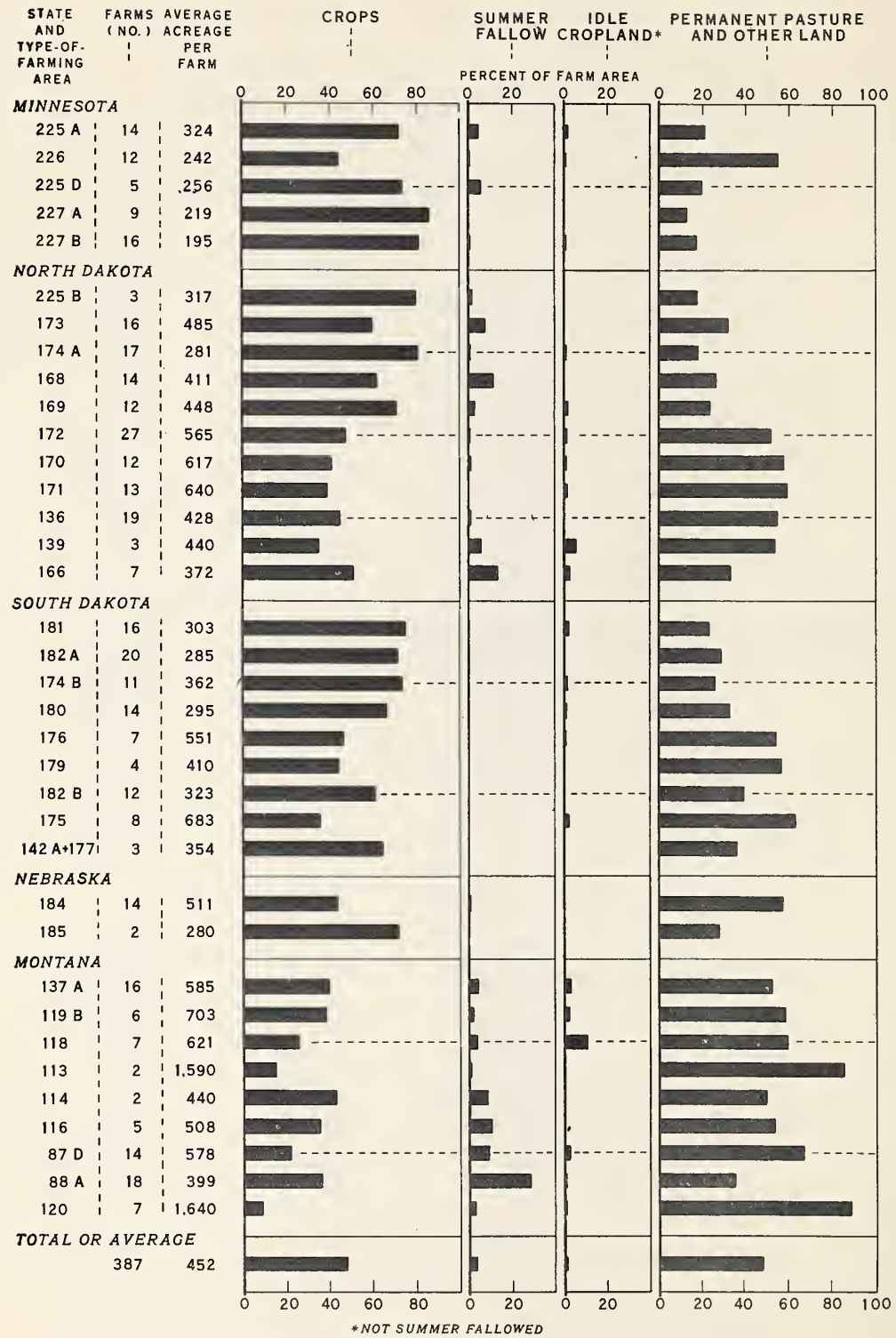

Figure 4. - Farms without tractors: Proportion of farm area in crops, summer fallow, permanent pasture and other land, for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

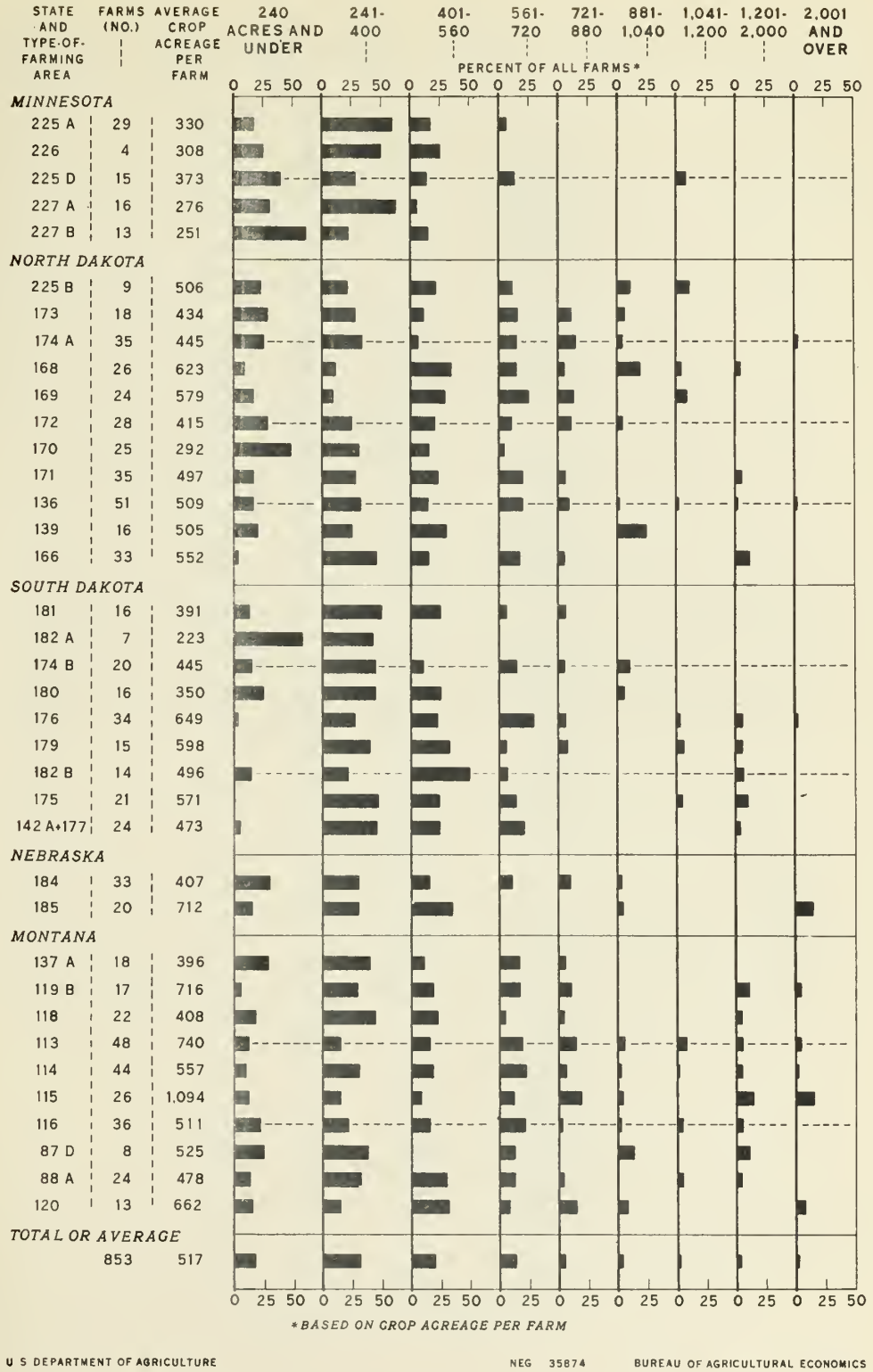

Figure 5. - Farms with tractors: Proportion of farms in each size group for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

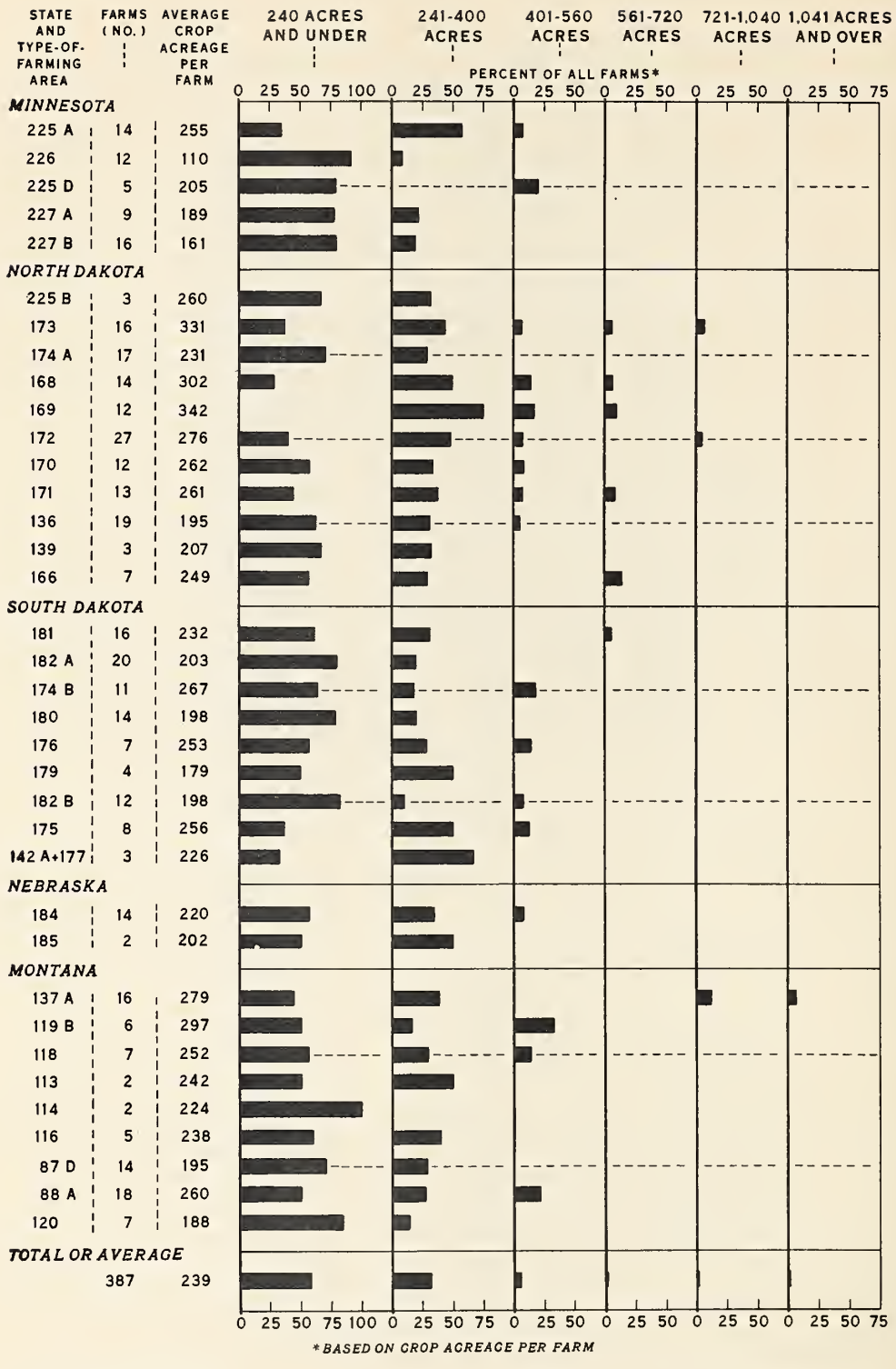

Figure 6. - Farms without tractors: Proportion of farms in each size group for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

Table 3.-Distribution of tractors of different types and sizes according to crop acres per farm, Northern Great Plains, 1933

Size group (crop acres)	All farms with tractors	Size (Drawbar horsepower)														Total Tractors
		General purpose		Ordinary high-wheel								Track-laying				
		9-12 h.p.	15 h.p.	8-12 h.p.	15-17 h.p.	18-21 h.p.	22-25 h.p.	26-28 h.p.	35-40 h.p.	20 h.p.	25 h.p.	39 h.p.	50 h.p.			
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number			Number
50 and less	1	-	-	1	-	-	-	-	-	-	-	-	-			1
51 to 100	4	-	-	4	-	-	-	-	-	-	-	-	-			4
101 to 150	36	3	-	17	15	2	-	-	-	-	-	-	-			37
151 to 200	49	4	-	22	20	4	-	-	-	-	-	-	-			50
201 to 250	67	8	-	21	35	8	-	1	-	-	-	-	-			73
251 to 300	98	19	-	32	40	6	2	1	-	-	-	-	-			100
301 to 350	82	9	-	12	47	13	3	-	-	-	-	-	-			84
351 to 400	72	6	1	9	43	12	1	1	-	-	-	-	-			73
401 to 450	56	5	-	10	29	11	1	3	-	-	-	-	-			59
451 to 500	51	3	2	9	27	7	5	2	1	-	-	-	-			56
501 to 550	55	11	-	9	33	8	3	2	-	-	-	-	-			66
551 to 600	44	4	-	6	29	8	1	3	-	-	-	-	-			51
601 to 650	42	4	-	6	24	10	1	3	-	1	1	-	-			50
651 to 700	38	4	-	4	30	4	3	1	-	-	-	-	-			46
701 to 750	17	2	-	1	6	9	3	-	-	-	-	-	-			21
751 to 800	17	-	-	-	13	1	1	3	-	-	-	-	-			18
801 to 850	13	2	-	-	9	2	2	1	-	1	-	-	-			17
851 to 900	23	1	-	3	15	7	1	1	-	-	-	-	-			28
901 to 950	8	-	1	-	6	2	1	-	-	-	-	-	-			10
951 to 1000	13	2	-	3	4	2	2	1	-	-	-	-	-			14
1001 to 1100	13	-	-	2	10	2	3	1	-	1	-	-	-			19
1101 to 1200	6	-	-	-	7	3	-	1	-	-	-	-	-			11
1201 to 1300	5	-	-	-	6	3	2	1	-	-	-	-	-			12
1301 to 1400	8	-	-	1	6	1	2	3	-	-	-	-	-			13
1401 to 1500	5	3	-	-	2	-	-	2	1	-	-	-	-			8
1501 to 1600	5	-	-	1	2	-	-	3	-	1	2	-	-			9
1601 to 1700	2	-	-	-	1	1	2	-	-	-	-	-	-			4
1701 to 1800	6	-	-	-	5	-	-	1	-	-	-	-	1			7
1801 to 1900	1	-	-	-	-	-	-	-	-	-	-	1	-			1
1901 to 2000	1	1	-	-	-	1	-	-	-	-	-	-	-			2
2001 to 2200	4	-	-	-	2	2	-	-	-	-	2	-	1			7
2201 to 2400	5	-	-	-	5	4	-	-	-	-	-	-	1			10
2401 to 2600	1	-	-	-	-	-	-	-	-	-	1	-	-			1
2601 to 2800	1	-	-	-	3	-	-	-	-	-	-	-	-			3
2801 to 3000	2	-	-	-	-	7	-	-	-	-	1	-	-			8
3001 and over	2	1	-	-	2	1	-	-	-	-	1	-	1			6
Total	853	92	4	173	476	141	39	35	2	4	8	1	4			979

those of the track-laying type, to be on the larger farms but a greater tendency for those farmers who are operators of large acreages to operate two or more tractors of medium size rather than the larger tractor.

For the most part, farmers with about 400 crop acres or less per farm had only one tractor, whereas on quite a large percentage of the farms with crop acreage in excess of this more than one tractor was owned. Fifty-five percent of all tractors enumerated were on farms of 500 crop acres or less, 32 percent were on farms of 501 to 1000 crop acres, and 12 percent were on farms of over 1000 crop acres.

Tractors of 15- to 17-drawbar horsepower, of the ordinary high-wheel type, were the most common and were followed in order by those of 8- to 12-drawbar horsepower. General purpose tractors of 9- to 12-drawbar horsepower were quite common in the areas of South Dakota and western Nebraska where row crops are grown to a considerable extent. Tractors of the track-laying type were reported only in Montana.

Livestock

The numbers of different classes of livestock on surveyed farms, in most areas, were small. The intensity of the livestock enterprise is indicated by the numbers of livestock per 100 acres of farm land (fig. 7).

Milk cows were reported in greatest numbers in the Red River Valley of North Dakota and Minnesota and in the eastern areas of South Dakota, where alfalfa is grown to a considerable extent. The hog enterprise was of greatest importance in southwestern Minnesota and in the eastern areas of South Dakota where a substantial acreage of corn is grown. Beef cattle were of some importance in central South Dakota and in certain areas of Montana.

The introduction of large units of power equipment has resulted in a heavy displacement of work stock and has enabled farmers to produce crops with a minimum of labor. The numbers of work stock per 100 acres of cropland for farms with tractors varied, as between areas, from .25 to 2.5, while on horse-operated farms the variation was from 1.3 to 3.9. The average number for all horse-operated farms was 2.7 per 100 acres of cropland compared with an average of 1 for all farms with tractors (fig. 8).

The numbers of various kinds of livestock per farm are shown by type-of-farming areas in appendix table 26.

Crops Grown and Their Place in the Cropping System

The agriculture of the arable lands of the region may be classified as primarily a cash grain type-of-farming with wheat the major crop. On surveyed farms the proportion of the crop area utilized for the production

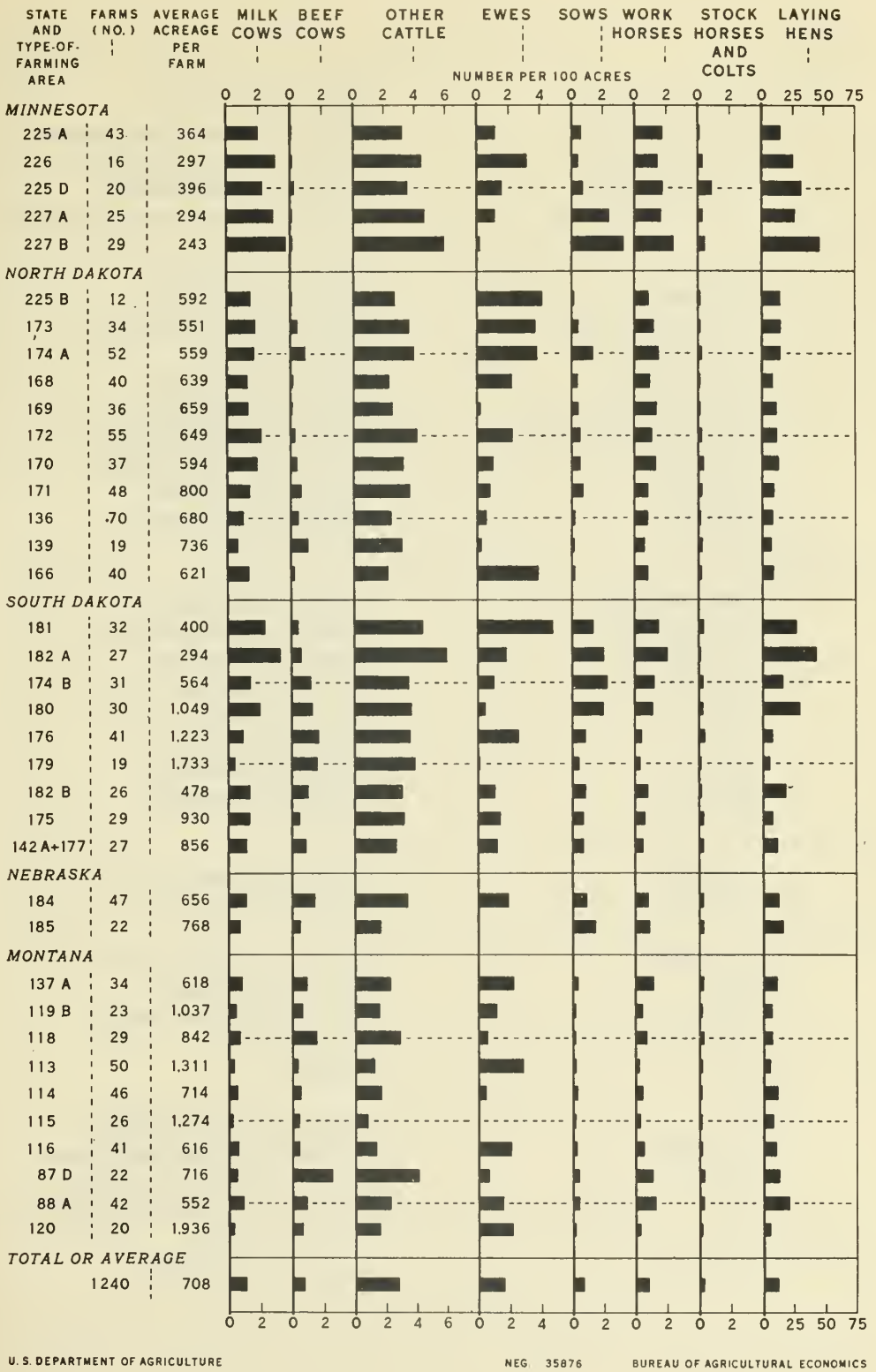

Figure 7. - Numbers of livestock per 100 acres of farm land by type-of-farming areas, Northern Great Plains, 1933

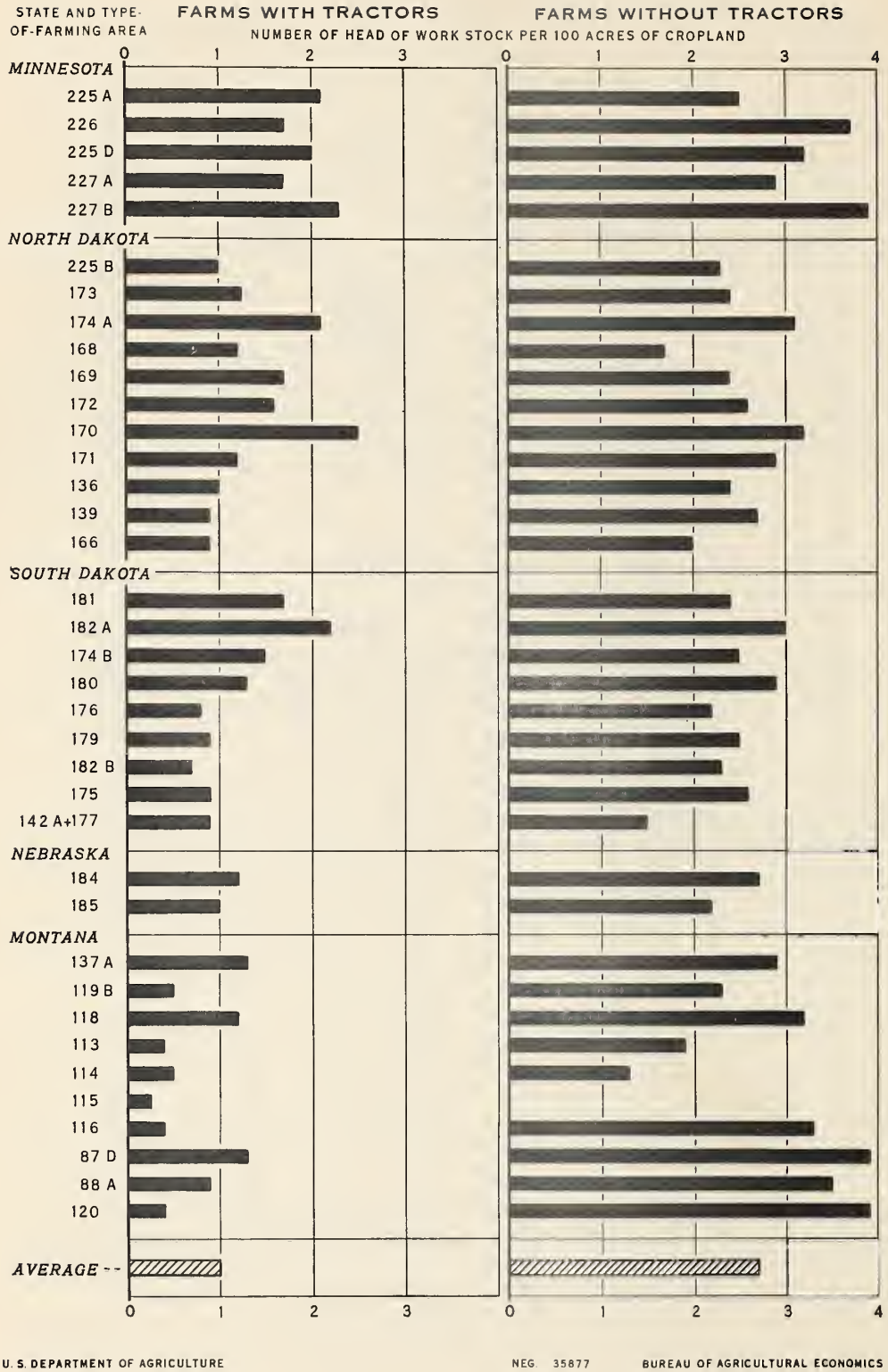

Figure 8. - Numbers of head of workstock per 100 acres of cropland by type-of-farming areas, Northern Great Plains, 1933

of different crops varied to a considerable extent as between different type-of-farming areas (figs. 9 and 10).

Proportionately more of the total crop area was devoted to wheat and summer fallow in west-central Montana than in other areas studied. Proceeding eastward, a rather decided change in crop combinations begins to appear. Instead of alternating wheat with summer fallow, the common practice was to grow wheat in combination with corn, oats and barley. In eastern Montana and northwestern and north-central North Dakota, wheat was the principal crop grown, with moderate acreages of oats, barley and corn. These crops with summer fallow accounted for most of the crop acreage. In southwestern North Dakota, western South Dakota and northwestern Nebraska, wheat was still the dominant crop, but the acreage devoted to corn, oats and barley showed a considerable increase over that of eastern Montana and northwestern and north-central North Dakota. In south-central North Dakota and central South Dakota, wheat still held first rank but acreages of oats and barley and especially corn in central South Dakota were of increasing importance. In eastern North Dakota and South Dakota and in western Minnesota, wheat occupied from 15 to 50 percent of the crop area, with barley, oats and corn making up most of the balance.

The greatest concentration of the corn acreage was in eastern South Dakota and southwestern Minnesota. In addition, alfalfa, sweet clover, and flax were of considerable importance on some farms, especially in western Minnesota. The distribution of the crop acreage per farm for surveyed farms, with and without tractors, is given by type-of-farming areas in appendix tables 27 and 28.

Spring wheat was alternated with summer fallow on 70 percent or more of the spring wheat acreage on surveyed farms in Areas 114, 83A and 87D of Montana. In other Montana areas, from 20 to 50 percent of the spring wheat acreage was alternated with summer fallow and the remainder largely seeded after small grains (fig.11).

In Areas 139, 166, 168 and 173 of North Dakota, 25 to 40 percent of the spring wheat acreage was alternated with summer fallow and the remainder almost entirely seeded after small grains. In other areas of North Dakota, from 60 to 90 percent of the spring wheat acreage was seeded after small grains and the remainder largely seeded after row crops.

In the Nebraska areas, 70 percent or more of the spring wheat acreage was seeded after row crops and the remainder seeded after small grains.

In Areas 180 and 182A of South Dakota, 90 percent or more of the spring wheat acreage was seeded after row crops and the remainder seeded after small grains. In Areas 181 and 175 of South Dakota, 80 percent or more of the spring wheat acreage was seeded after small grains and the remainder seeded after row crops. In other areas of South Dakota, from 45 to 55 percent of the spring wheat acreage was seeded after small grains and the remainder seeded after row crops.

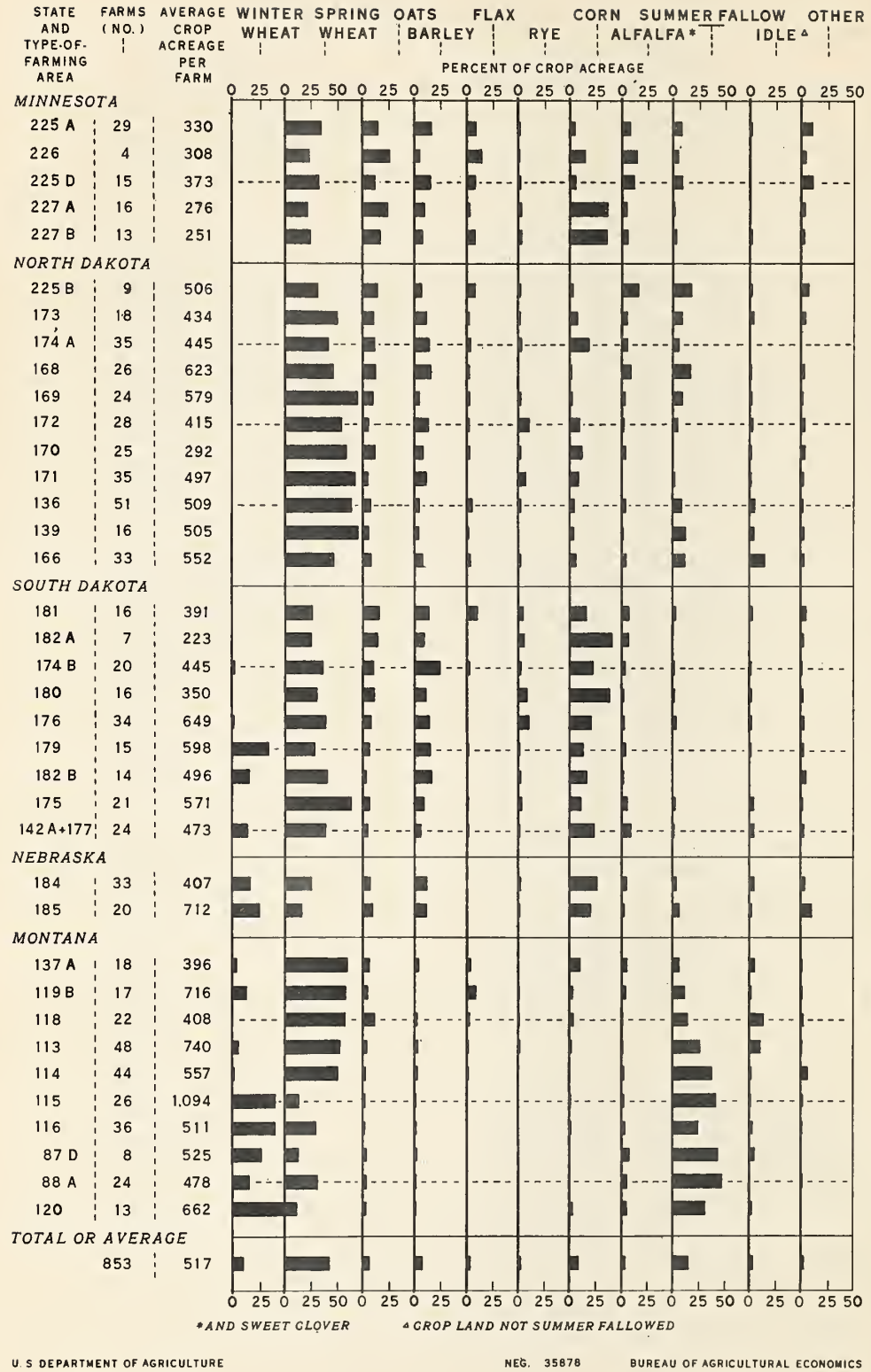

Figure 9. - Farms with tractors: Proportion of crop acreage in specified crops for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

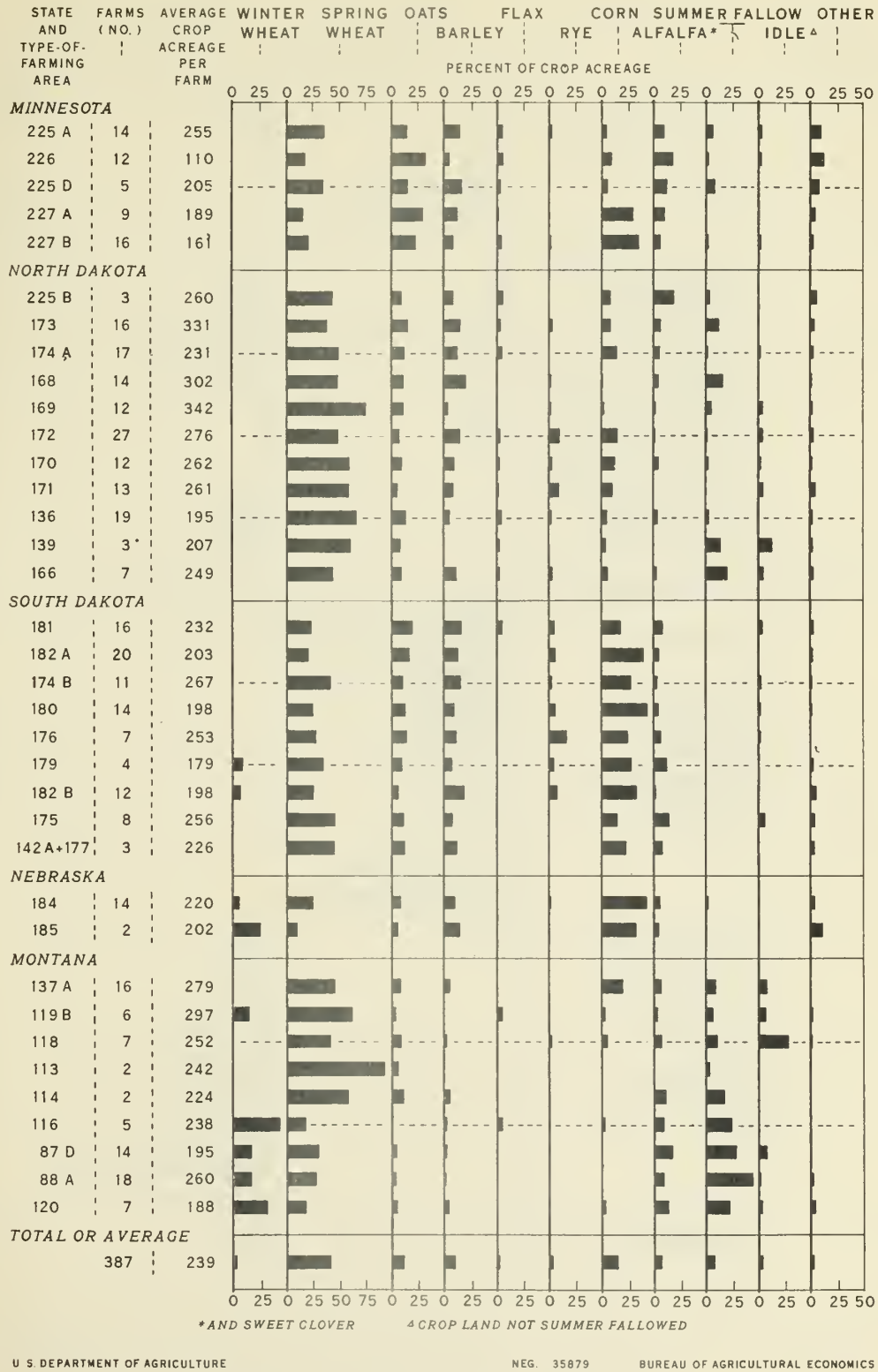

Figure 10. - Farms without tractors: Proportion of crop acreage in specified crops for surveyed farms by type-of-farming areas, Northern Great Plains, 1933

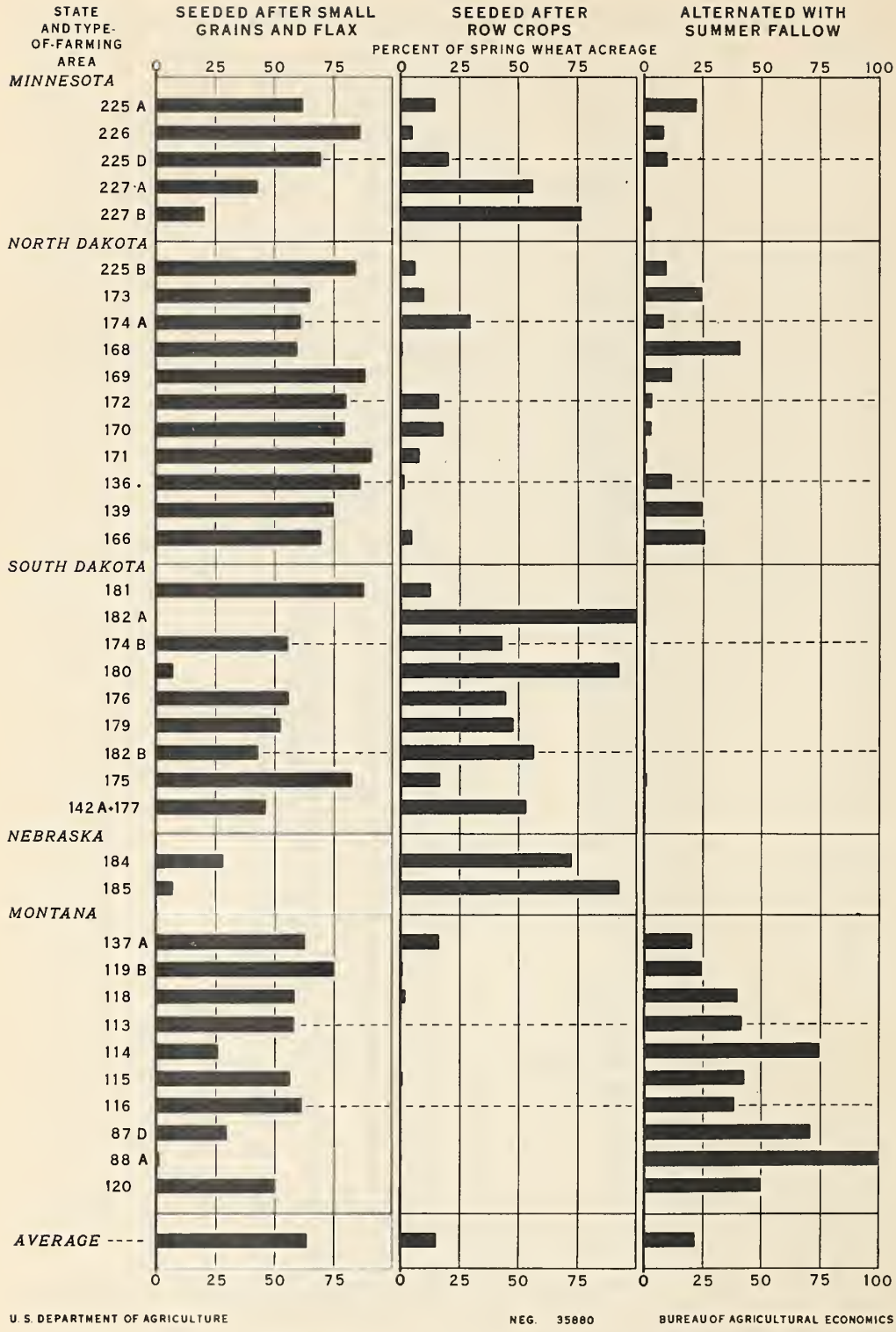

Figure 11. - Proportion of spring wheat acreage seeded after small grains, after row crops and alternated with summer fallow on surveyed farms by type-of-farming areas, 1933

In southwestern Minnesota, 55 percent or more of the spring wheat acreage was seeded after row crops and the remainder largely seeded after small grains. In other areas of western Minnesota 65 percent or more of the acreage was seeded after small grains and the remainder largely seeded after row crops.

Winter wheat was not grown to any extent except in west-central Montana, northwestern Nebraska and in south-central South Dakota. In west-central Montana, from 50 to 100 percent of the winter wheat acreage was alternated with summer fallow. In those areas of west-central Montana where winter wheat was not entirely alternated with summer fallow the remainder was seeded after small grains. In northwestern Nebraska and south-central South Dakota, 65 percent or more of the winter wheat acreage was seeded after small grains and the remainder largely seeded after row crops.

Oats and barley were grown on most surveyed farms except in Montana where the acreage of barley, especially, was very limited. For a given area the proportion of the acreage that was seeded after small grains and flax, seeded after row crops, and alternated with summer fallow was quite similar for each of these crops. The proportion of the oats acreage seeded after small grains and flax, seeded after row crops, and alternated with summer fallow on surveyed farms is shown in figure 12.

The oats crop in Areas 114 and 88A of Montana was alternated with summer fallow on 45 percent or more of the oats acreage and the remainder seeded after small grains. In Area 137A of Montana, about two-thirds of the oats acreage was seeded after small grains and one-third seeded after row crops. In other areas of Montana, 70 percent or more of the oats acreage was seeded after small grains and the remainder largely alternated with summer fallow.

In northwestern Nebraska, about two-thirds of the oats acreage was seeded after row crops and one-third seeded after small grains.

In South Dakota, 65 percent or more of the oats acreage in Areas 181, 174B and 175 was seeded after small grains and the remainder after row crops. In Areas 142A and 177 of South Dakota about one-half of the oats acreage was seeded after small grains and about one-half after row crops. In other areas of South Dakota 60 percent or more of the oats acreage was seeded after row crops and the remainder seeded after small grains.

In North Dakota, 70 percent or more of the oats acreage was seeded after small grains and the remainder largely seeded after row crops.

In Southwestern Minnesota, about two-thirds of the oats acreage was seeded after row crops and one-third seeded after small grains. In other areas of western Minnesota 90 percent or more of the oats acreage was seeded after small grains and the remainder seeded after row crops.

In most areas, on surveyed farms, flax was grown to only a limited extent. In Areas 225A of Minnesota and 225B of North Dakota, a limited acreage of flax was grown on summer fallow land, while in southwestern Minnesota and in Area 171 of North Dakota, a small acreage was grown after row crops.

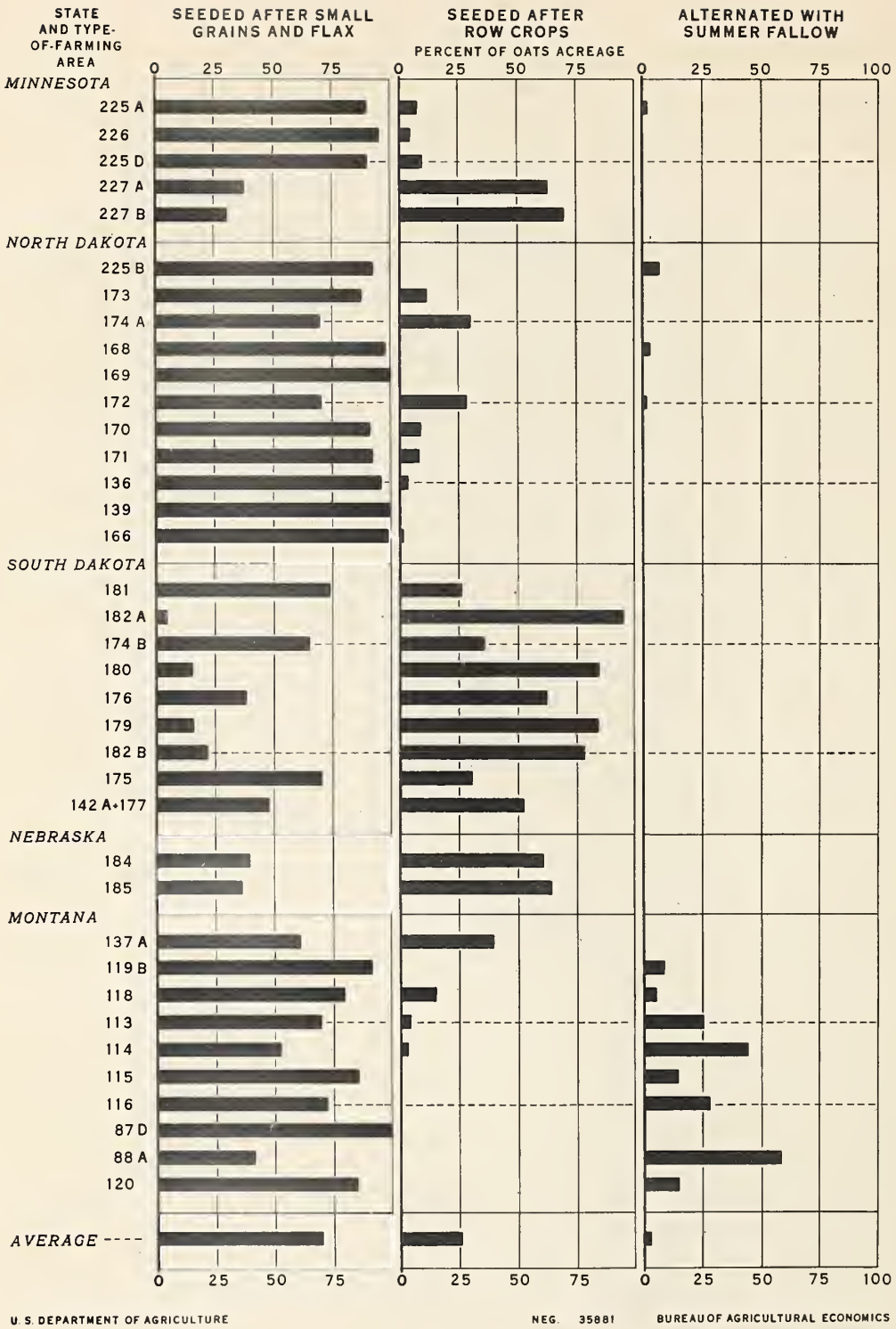

Figure 12. - Proportion of oats acreage seeded after small grains, after row crops and alternated with summer fallow on surveyed farms by type-of-farming areas, 1933

In Area 170 of North Dakota some flax was grown after row crops and on new land. In other areas 75 percent or more of the flax acreage, on surveyed farms, was seeded after small grains.

The corn acreage was all represented by land that had been in a small grain or flax crop the previous year.

SEEDBED PREPARATION AND PLANTING

Because of variations in the number and kind of operations performed on different crops, the implements employed in seedbed preparation and planting field crops are shown according to their use on individual crops in different areas. The size of implement and motive power used in seedbed preparation for small grains, flax and corn and for seeding small grains and flax has not been shown by individual crops, since in most cases, an implement of a given size drawn by a designated power unit is used on all of these crops that are grown on a given farm. This simplifies the discussion of tillage implements common to several crops and the power used to draw them.

Operations Performed in Seedbed Preparation and Planting Field Crops According to their Place in the Cropping System

The implements used in tillage practice varied both between and within areas. Soil conditions, topography, and quantity and seasonal distribution of rainfall, differ too widely to make it possible to handle the land in a uniform manner. Furthermore, the operations performed are greatly influenced by whether the crop in question follows a drilled crop, an intertilled crop, or is planted on summer fallowed land.

In general, the operations performed in preparing a suitable seedbed are greatest where the summer fallow method of crop production prevails, somewhat less when following a drilled crop, and least when grown after an intertilled crop (mostly corn).

The ground may be plowed either in the fall or spring. In western Minnesota, eastern North Dakota, and eastern South Dakota, fall plowing was the rule for spring planted small grains and flax where these crops followed a small grain, flax, or row crop. Since spring wheat is the first crop planted in the spring as much plowing is done in the fall as is possible. Farmers in these areas practice fall plowing for spring wheat relatively more than for oats and barley. Fall plowing is done during the period after harvest until the ground freezes. In the central and western Dakotas and in Montana, spring plowing for spring planted small grains and flax was the rule.

Small Grains and Flax Grown After Small Grains and Flax

After a drilled crop such as wheat, oats, barley or flax, the land in usually more or less weedy and the top soil is hard. Therefore considerable work is usually necessary in preparing a proper seedbed. The usual operations in preparation of seedbed and seeding wheat, oats, barley and flax where grown on stubble land are shown in table 4.

Table 4 - Common practices employed in seedbed preparation and seeding small grains and flax where grown after small grains and flax, by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Practice followed	Proportion of acreage represented: Spring wheat	Oats	Barley	Flax
		Per-cent	Per-cent	Per-cent	Per-cent
Minnesota					
225A	MP(1)D(1or2)H(1or2)Dr(1)	33	35	35	23
	MP(1)H(1or2)Dr(1)	30	37	26	20
	MP(1)Duft(1or2)H(1or2)Dr(1)	23	22	31	—
Total		86	94	92	43
226	MP(1)D(1or2)H(1or2)Dr(1)	43	47	35	64
	MP(1)Spt(1or2)H(1or2)Dr(1)	18	30	—	11
	MP(1or2)H(1or2)Dr(1)	19	17	31	—
Total		80	94	66	75
225D	MP(1)H(1or2)Dr(1)	34	31	43	18
	MP(1)Duft(1or2)H(1or2)Dr(1)	32	32	17	25
	MP(1)D(1or2)H(1or2)Dr(1)	15	23	18	49
Total		81	86	78	92
227A	MP(1)H(1or2)Dr(1)	56	78	63	54
	MP(1) D(1or2)H(2or3)Dr(1)	21	6	29	—
	MP(1)H(1or2)P(1)Dr(1)	--	—	5	36
Total		77	84	97	90
227B	MP(1)H(2or3)Dr(1)	67	51	77	—
	MP(1)H(1or2)Dr(1)	25	6	13	17
	MP(1)D(1or2)H(2or3)Dr(1)	8	—	3	--
	MP(1)D(1or2)H(1or2)Dr(1)	—	21	—	70
Total		100	78	93	87
North Dakota					
225B	MP(1)Duft(1)Dr(1)	30	35	28	—
	MP(1)H(2or3)Dr(1)	24	20	23	—
	MP(1)D(1or2)H(2)Dr(1)	6	19	26	—
	MP(1)Duft(1)H(1)Dr(1)	3	5	11	—
Total		63	79	88	—
173	MP(1)Spt(1)Dr(1)	41	14	14	—
	MP(1)D(1)Dr(1)	12	9	32	—
	MP(1)D(1)H(1)Dr(1)	11	5	4	—
	MP(1)Duft(1)Dr(1)	10	--	5	—
	MP(1)H(1or2)Dr(1)	7	24	19	—
Total		81	52	74	—
174A	MP(1)H(1or2)Dr(1)	61	65	59	49
	MP(1)D(1or2)H(1or2)Dr(1)	8	21	11	24
	MP(1)D(1)Dr(1)	7	5	16	—
Total		76	91	86	73
North Dakota					
168	MP(1)H(2or3)Dr(1)	29	31	18	—
	MP(1)D(1)H(1or2)Dr(1)	22	23	14	—
	MP(1)H(1or2)Dr(1)	11	7	36	—
	MP(1)D(1)H(2)P(1)Dr(1)	—	14	—	--
Total		62	75	68	—
169	MP(1)H(1or2)Dr(1)	26	12	18	—
	MP(1)D(1)H(1or2)Dr(1)	22	—	--	—
	MP and P and Dr(1)	23	26	24	--
	MP(1)Dr(1)	10	4	2	—
	MP and P(1)H(1or2)Dr(1)	3	28	36	--
	MP and P(1)Dr(1)	3	27	20	—
Total		87	97	100	—
172	MP(1)Dr(1)	25	18	22	62
	MP(1)H(1or2)Dr(1)	19	56	27	—
	D(1)Dr(1)	15	—	4	8
	Dr(1)H(1or2)	10	—	--	—
	Dr(1)	8	—	2	—
	MP and H(1)Dr(1)	—	—	14	--
	MP(1)H(1or2)P(1)Dr(1)	—	—	--	18
Total		77	74	69	88
170	MP(1)H(1or2)Dr(1)	21	18	21	—
	MP and H(1)Dr(1)	23	37	30	--
	MP(1)Dr(1)	12	4	9	—
	MP and P(1)H(1)Dr(1)	—	12	8	24
	MP(1)D(1or2)H(1or2)Dr(1)	—	—	--	29
	MP and H(1)H(1)Dr(1)	7	5	7	19
	D(1or2)Dr(1)	9	—	—	—
	Dr(1)	9	—	—	—
Total		81	76	75	72
171	D(1)Dr(1)	23	12	8	—
	MP(1)Dr(1)	7	7	10	—
	MP(1)H(1or2)Dr(1)	9	12	15	—
	MP(1)Dr andH(1)	10	11	—	—
	MP and H(1)Dr(1)	12	26	16	—
Total		61	68	49	—
North Dakota					
136	MP(1)Dr(1)	14	15	11	6
	MP and H(1)H(1or2)Dr(1)	10	3	14	—
	MP and H(1)P(1)Dr and H(1)	—	—	—	38
	MP(1)H(1or2)Dr(1)	7	29	15	24
	MP(1)H(3or4)Dr(1)	—	9	—	—
	MP and P(1)Dr(1)	5	8	14	7
	MP(1)D(1)H(1)Dr(1)	—	—	—	18
	D(1)H(1)Dr(1)	8	2	—	—
	D and Dr(1)	5	—	—	—
	1-way(1)Dr(1)	3	—	—	—
	1-way and Dr(1)	5	—	—	—
Total		57	66	54	93
139	D(1)Dr and H(1)	21	—	—	—
	D(1)Dr(1)H(1)	6	13	11	—
	MP and P(1)H(1)Dr(1)	14	2	6	—
	MP and H(1)Dr(1)	13	12	29	—
	MP andH(1)H(1or2)Dr(1)	6	8	—	—
	MP(1)H(1or2)Dr(1)	4	31	22	—
	Dr(1)	4	—	29	—
Total		68	66	97	—
166	MP(1)H(1or2)Dr(1)	28	33	16	—
	MP(1)D(1)H(1)Dr(1)	9	6	7	—
	MP(1)Dr(1)	7	7	--	—
	MP and H(1)H(1or2)Dr(1)	8	—	14	—
	MP and P(1)H(1or2)Dr(1)	11	8	14	—
	MP and P(1)Dr(1)	12	30	12	—
	MP and P andDr(1)	8	8	17	—
Total		83	92	80	—
South Dakota					
181	MP(1)H(1or2)Dr(1)	69	61	80	—
	MP(1)H(2 or3)Dr(1)	14	3	—	16
	MP(1)H(1)P(1)Dr(1)	—	—	—	29
	MP(1)D(1)P(1)Dr(1)	—	--	--	15
	MP(1)Duft(1 or2)Dr(1)	—	9	10	—
Total		83	73	90	60
174B	MP(1)H(1or2)Dr(1)	48	61	63	—
	MP and H(1)H(1)Dr(1)	9	11	8	—
	D(1)Dr(1)	12	8	3	—
Total		69	80	74	—

Table 4 - Common practices employed in seedbed preparation and seeding small grains and flax where grown after small grains and flax, by type-of-farming areas, Northern Great Plains. Continued 1/

State and type-of-farming area	Practice followed	Proportion of acreage represented				
		Spring wheat	Winter wheat	Oats	Barley	Flax
		Percent	Percent	Percent	Percent	Percent
South Dakota						
180	D(1)H(1)	65	—	90	94	
	D(1)End-gate(1)H(1)	35	—	21	—	
	[illegible]2)End-gate(1)H(1)	—	—	16	—	
Total		100	—	87	94	
176	MP and H(1)Dr and P(1)	15	—	—	—	
	D(1)Dr and P (1)	16	--	—	—	
	D(lor2)Dr(1)H(1)	7	—	20	22	
	D(1)Dr(1)	12	—	7	6	
	D and Dr and H(1)	9	—	—	—	
	Dr(1)	--	100	—	—	
	End-gate (1)D(1)H(lor2)	12	—	41	34	
Total		71	100	68	62	
179	D(1)Dr(1)	51	—	100	34	
	D and Dr(1)	—	—	—	17	
	Dr(1)	11	77	—	49	
	D(1) End-gate (1)	11	—	—	—	
Total		73	77	100	100	
182B	Dr(1)	56	26	—	—	
	D and Dr(1)	42	—	—	27	
	1-way(1) D and Dr(1)	—	59	—	—	
	D(lor2)Dr(1)	—	15	—	36	
	End-gate(1)D(1)	—	—	—	34	
Total		98	100	--	97	
175	D and Dr(1)	34	—	12	22	
	D(lor2)Dr(1)	—	—	18	—	
	MP and H(1)Dr(1)	12	—	25	24	
	MP(1)H(lor2)Dr(1)	7	—	26	16	
Total		53	—	81	62	
142A & 177	D(lor2)Dr(1)	33	29	15	67	
	D and H(1)Dr(1)	18	—	—	—	
	1-way (1)Dr and H(1)	19	—	—	—	
	1-way (1)Dr(1)	—	47	—	—	
	Dr(1)	—	18	15	—	
	MP(1)H(lor2)Dr(1)	—	—	23	—	
	D(1)Dr and H(1)	—	—	23	—	
	Dr(1)End(1)	—	—	—	22	
Total		70	94	76	89	
Nebraska						
184	D and Dr(1)	38	—	14	—	—
	D(1)Dr(1)	—	21	34	33	—
	D and Dr and P(1)	16	—	27	12	—
	MP and H(1)Dr and H(1)	25	—	14	--	—
	MP(1)Dr(1)	—	32	—	—	—
	1-way (1)Dr and P(1)	—	21	5	23	—
	1-way(1)Dr(1)	—	21	—	—	—
Total		79	95	94	68	—
185	D(1)Dr(1)	100	62	100	77	--
	D and Dr(1)	--	38	--	9	—
Total		100	100	100	86	—
Montana						
137A	MP(1)H(lor2)Dr(1)	29	—	50	—	—
	MP(1)H(2or3)Dr(1)	—	—	—	26	—
	MP and H(1)H(1)Dr(1)	—	—	—	13	—
	D(1)H(1)Dr and H(1)	13	—	—	--	—
	D and H(1)Dr and H(1)	8	—	17	—	—
	D(1)Dr(1)	7	—	—	—	—
	D(lor2)H(lor2)Dr(1)	6	—	—	—	—
	Dr(1)	—	100	8	—	—
	D(lor2)H(1)Dr(1)	—	—	—	22	—
	Duft(1)H(1)Dr and H(1)	—	—	—	18	—
Total		63	100	75	79	—
119B	D(lor2)Dr(1)	27	—	—	—	—
	Dr(1)	24	100	—	—	—
	MP and H(1)Dr(1)	—	—	27	—	3
	MP(1)H(lor2)Dr(1)	8	—	14	—	34
	MP and P and Dr(1)	6	—	21	—	42
Total		65	100	62	—	79
118	Duft and Dr(1)	19	—	18	—	—
	Duft (1)Dr(1)	13	—	—	—	—
	Duft and Dr and H(1)	11	—	12	—	—
	Duft and H(1)Dr and H(1)	8	—	—	—	—
	MP and H(1)Dr and H(1)	12	—	26	—	—
	MP and H(1)Dr(1)	8	—	9	—	—
	MP(1)Dr(1)	—	—	12	—	—
Total		71	—	77	—	—
Montana						
113	1-way(1)Dr(1)	21	—	5	15	
	1-way and Dr(1)	11	—	—	—	
	1-way(1)H(1)Dr(1)	—	—	10	24	
	1-way and H(1)Dr(1)	—	—	8	—	
	D(1)Dr(1)	13	—	4	—	
	D and Dr(1)	7	—	9	—	
	MP and H(1)Dr(1)	7	—	14	—	
	MP and H(1)Spt and Dr(1)	—	—	—	27	
	MP and P and Dr(1)	—	—	8	—	
	MP and Dr(1)	—	—	—	11	
	Dr(1)	—	100	—	—	
Total		59	100	58	77	
114	D(lor2)Dr(1)	30	—	—	—	
	D(lor2)Dr and H(1)	10	—	—	—	
	D(1)Duft (1)Dr(1)	—	—	23	—	
	1-way(1)Dr and H(1)	19	—	12	—	
	1-way and H(1)Dr and H(1)	—	—	39	—	
Total		59	—	74	—	
115	D(1)Dr(1)	33	—	—	—	
	D and Dr(1)	—	26	—	—	
	D(1)H(1)Dr(1)	16	—	—	—	
	DP(1)H(1)D(1)Dr(1)	14	—	—	—	
	1-way and Dr(1)	8	—	—	—	
	Dr(1)	—	70	—	—	
Total		71	96	—	—	
116	1-way(1) H(1)Dr(1)	16	—	13	—	
	1-way(1)Dr(1)	14	—	50	—	
	1-way and H(1)D and Dr(1)	8	—	—	—	
	D and Dr(1)	16	6	—	—	
	Dr(1)	9	88	—	—	
	DP(1)H(1)Dr(1)	2	—	—	50	
	DP(1) D and Dr(1)	—	—	—	50	
Total		65	94	63	100	
87D	MP(1)H(1)L(lor2)Dr(1)	44	—	16	—	
	MP(1)H(3or4)L(2)Dr(1)	32	—	15	20	
(Irrigated)	MP(1)H(lor2)L(3or4)Dr(1)	17	—	15	29	
	MP(1)D(2)H(2)L(3)Dr(1)	—	—	40	51	
	MP and H(1)L(lor2)Dr(1)	7	—	14	—	
Total		100	—	100	100	

1/ Tillage and planting implements are abbreviated as follows: MP=moldboard plow, 1-way = vertical disk plow, DP = disk plow, H = spike-tooth harrow, Spt = spring-tooth harrow, D= disk harrow, P = packer, L = level, Duft = duckfoot cultivator, Dr = drill, End-gate = end-gate seeder.

Plowing with the moldboard plow was a common practice in all areas of western Minnesota and eastern North Dakota. In certain areas of west-central Montana, the one-way vertical disk plow was commonly used in the initial operation in preparing the seedbed. The disk harrow was substituted for the plow to a considerable extent in most areas except those in western Minnesota and in eastern North Dakota. Drilling in stubble was a common practice in most areas where winter wheat was grown.

Where land was plowed with the moldboard plow common practice consisted of plowing 1 time, spike-tooth harrowing 1 or 2 times and drilling. In some areas the disk harrow, spring-tooth harrow or duckfoot cultivator was used in addition to the spike-tooth harrow. Moldboard plowing in a combination hitch with another tillage implement was a common practice in the central and western Dakotas and in Montana.

A common practice, where the one-way vertical disk plow was used, consisted of one-way plowing, spike-tooth harrowing 1 or 2 times, and drilling. On some farms one-way plowing and spike-tooth harrowing were done as one operation, while on other farms, drilling and spike-tooth harrowing were done in combination.

Where the disk harrow was substituted for the plow in the preparation of the seedbed, a common practice was to disk harrow 1 or 2 times and drill. Some farmers disked and drilled in a single operation, while others disked 1 time, spike-tooth harrowed 1 time and drilled.

In areas where drilling was the first operation, the land either received no other preparation or it was spike-tooth harrowed 1 or 2 times.

Where small grains were broadcasted with an end-gate seeder, it was a common practice to disk harrow 1 or 2 times and spike-tooth harrow 1 time.

Corn Grown After Small Grains and Flax

Practically all corn was grown after small grains or flax. The usual practices in preparing the seedbed and planting corn that follows these crops are shown in table 5.

In south-central South Dakota, northwestern Nebraska and to some extent in eastern Montana corn was planted with a lister planter, a machine which opens up the furrow and plants the seed in the open furrow in one operation. Where this practice was followed a common way was to disk harrow 1 time, lister plant 1 time, spike-tooth harrow 1 or 2 times and cultivate 2 or 3 times with a lister cultivator.

In western Minnesota, North Dakota, central Montana, and in South Dakota except in the south-central part, corn was surface planted. When planted for grain it is commonly check-planted, when intended for fodder or silage it is usually drill planted. Where corn was surface planted most farmers, as the initial operation in preparing the seedbed, plowed the land with a moldboard plow. In the Red River Valley of Minnesota and North Dakota

Table 5. - Common practices employed in seedbed preparation and planting corn where grown after small grains and flax, by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Practice followed	Proportion of acreage represented
		Percent
Minnesota		
225A	MP(1)D(1or2)H(1or2)SP(1)Cult(3or4)	20
	MP(1)D(1)H(3)SP(1)Cult(3or4)	8
	MP(1)H(3or4)SP(1)Cult(3)	14
	MP(1)H(3)SP(1)Cult(4or5)	9
	MP(1)H(2)Duft(1)SP(1)Cult(3)	9
	MP(1)H(3)Duft(1)SP(1)Cult(5)	7
	MP(1)H(5)Duft(1)SP(1)Cult(4)	7
Total		74
226	MP(1)H(2or3)SP(1)Cult(3or4)	15
	MP(1)H(4or5)SP(1)Cult(4)	13
	MP(1)H(4)Duft(1)SP(1)Cult(3)	11
	MP(2)H(3or4)SP(1)Cult(4)	10
	MP(1)D(1)H(1)SP(1)Cult(6)	13
	MP(1)D(2)H(3)SP(1)Cult(6)	10
Total		72
225D	MP(1)D(1or2)H(2or3)SP(1)Cult(3or4)	28
	MP(1)D(1)H(1)SP(1)Cult(4)	12
	MP(1)D(1)H(5)SP(1)Cult(4)	9
	MP(1)D(4)H(1)P(1)SP(1)Cult(4)	9
	MP(2)H(2)SP(1)Cult(6)	12
	MP(1)H(2)P(1)SP(1)Cult(4)	8
Total		78
227A	MP(1)D(1or2)H(2or3)SP(1)Cult(3or4)	19
	MP(1)D(1or2)H(2or3)SP(1)Cult(5)	15
	MP(1)D(2)H(4)SP(1)Cult(3or4)	7
	MP(1)D(1)H(1)SP(1)Cult(4)	11
	MP(1)H(2or3)SP(1)Cult(3or4)	17
	MP(1)H(2or3)SP(1)Cult(6)	9
Total		78
227B	MP(1)D(1or2)H(1or2)SP(1)Cult(3or4)	39
	MP(1)D(1)H(2or3)SP(1)Cult(5or6)	17
	MP(1)D(1or2)H(3or4)SP(1)Cult(2or3)	11
	MP(1)D(1or2)H(1or2)SP(1)Cult(5)	11
Total		78
North Dakota		
225B	MP(1)H(2)Spt(2)SP(1)Cult(5)	28
	MP(1)D(2)H(1)SP(1)Cult(5)	13
	MP(1)H(5)SP(1)Cult(4)	12
	MP(1)H(2)Spt(2)SP(1)Cult(3)	10
	MP(1)Spt(3)SP(1)Cult(4)	8
Total		71
173	MP(1)H(2or3)SP(1)Cult(3or4)	23
	MP(1)H(4)SP(1)Cult(3)	17
	MP(1)H(5or6)SP(1)Cult(4)	15
	MP(1)H(2or3)SP(1)Cult(5or6)	9
	MP(1)H(2)SP(1)Cult(7or8)	7
	MP(1)D(1or2)H(3or4)SP(1)Cult(4or5)	7
Total		78
174A	MP(1)D(1or2)H(2or3)SP(1)Cult(5or6)	18
	MP(1)D(1or2)H(2or3)SP(1)Cult(3or4)	15
	MP(1)D(1or2)H(4or5)SP(1)Cult(3or4)	6
	MP(1)H(3or4)SP(1)Cult(3or4)	16
	MP(1)H(1or2)SP(1)Cult(3)	14
Total		69
168	MP(1)D(2)Duft(1)H(2)SP(1)Cult(6)	51
	MP(1)H(2)SP(1)Cult(2)	36
	MP(1)H(2or3)SP(1)Cult(4)	13
Total		100

State and type-of-farming area	Practice followed	Proportion of acreage represented
		Percent
North Dakota		
169	MP(1)H(3or4)SP(1)Cult(3or4)	18
	MP(1)H(4)SP(1)Cult(6)	8
	MP(1) D(1)H(2or3)SP(1)Cult(3or4)	14
	MP and P(1)H(3or4)SP(1)Cult(3or4)	22
	MP and P(1)H(2)P(1)SP(1)Cult(2)	9
Total		71
172	MP(1)H(3or4)SP(1)Cult(3or4)	34
	MP(1)H(2or3)SP(1)Cult(2or3)	13
	MP(1)H(4or5)SP(1)Cult(2or3)	8
	MP(1)H(1or2)SP(1)Cult(3or4)	6
	MP and H(1)H(1or2)SP(1)Cult(3)	8
	MP and P(1)H(1or2)SP(1)Cult(3or4)	8
Total		77
170	MP and H(1)H(1or2)SP(1)Cult(3)	15
	MP and H(1)H(3or4)SP(1)Cult(3)	14
	MP(1)H(3or4)SP(1)Cult(3or4)	13
	MP(1)H(2or3)SP(1)Cult(2)	7
	MP and H(1)P(1)H(1or2)SP(1)Cult(2or3)	11
	MP and P(1)H(1or2)SP(1)Cult(3)	8
	LP(1)H(1)Cult(2)	13
Total		81
171	MP(1)H(2or3)SP(1)Cult(2or3)	17
	MP and H(1)H(2or3)SP(1)Cult(2or3)	13
	MP and H(1)H(1)SP(1)Cult(3or4)	11
	MP and P(1)H(3or4)SP(1)Cult(2or3)	13
	MP and P(1)H(1or2)SP(1)Cult(3or4)	12
Total		66
136	MP(1)H(3or4)SP(1)Cult(3or4)	13
	MP(1)H(1or2)SP(1)Cult(3or4)	8
	MP(1)H(2or3)SP(1)Cult(1or2)	7
	MP and H(1)H(1or2)SP(1)Cult(1or2)	10
	MP and H(1)H(2or3)SP(1)Cult(2or3)	8
	MP and H(1)H(4or5)SP(1)Cult(1)	5
	MP and P(1)H(2or3)SP(1)Cult(3or4)	10
Total		61
139	MP(1)D(1)H(2)SP(1)Cult(3)	21
	MP and H(1)H(1or2)SP(1)Cult(2or3)	22
	MP and H(1)D(1)H(1)SP(1)Cult(1)	17
	MP and H(1)SP(1)Cult(3)	8
	MP and P(1)H(1)SP(1)Cult(2)	19
Total		87
166	MP(1)D(2)H(2)SP(1)Cult(2)	15
	MP(1)H(4or5)SP(1) Cult(3or4)	6
	MP and P(1)SP(1)Cult(3or4)	29
	MP and P(1)H(2or3)SP(1)Cult(2)	10
Total		60
South Dakota		
181	MP(1)H(4or5)SP(1)Cult(3or4)	33
	MP(1)H(2or3)SP(1)Cult(4or5)	20
	MP(1)H(3)SP(1)Cult(2or3)	11
	MP(1)D(1)H(2or3)SP(1)Cult(3or4)	10
Total		74
182A	MP(1)H(3or4)SP(1)Cult(3or4)	47
	MP(1)H(1or2)SP(1)Cult(3)	17
	MP(1)D(1)H(3or4)SP(1)Cult(3or4)	22
Total		86
174B	MP(1)H(3or4)SP(1)Cult(3or4)	25
	MP(1)H(2)SP(1)Cult(2or3)	20
	MP(1)H(5or6)SP(1)Cult(3)	7
	MP and H(1)H(2or3)SP(1)Cult(2or3)	24
Total		76

State and type-of-farming area	Practice followed	Proportion of acreage represented
		Percent
South Dakota		
180	MP(1)H(3or4)SP(1)Cult(2or3)	28
	MP(1)H(1or2)SP(1)Cult(2or3)	17
	MP(1)H(5)SP(1)Cult(3)	6
	MP and H(1)H(3)SP(1)Cult(3or4)	20
Total		71
176	MP(1)H(3or4)SP(1)Cult(1or2)	17
	MP(1)H(1or2)SP(1)Cult(2or3)	9
	MP and H(1)H(2or3)SP(1)Cult(3)	15
	MP and H(1)H(4or5)SP(1)Cult(2or3)	13
	MP and H(1)H(3or4)SP(1)Cult(1or2)	12
	MP and H(1)H(1or2)SP(1)Cult(1or2)	7
	LP(1)Cult(2)	11
Total		84
179	D(1)LP(1)Cult(2or3)	36
	D(1)LP(1)Cult(1)	10
	D(1)LP(1)H(1)Cult(2or3)	22
	LP(1)Cult(3or4)	21
	LP(1)Cult(1)	11
Total		100
182B	D(1)LP(1)Cult(2)	65
	D(1)LP(1)H(1)Cult(3)	18
	D(1)LP(1)H(1or2)Cult(1or2)	14
Total		97
175	MP(1)H(3or4)SP(1)Cult(3)	14
	MP(1)H(1or2)SP(1)Cult(1)	9
	MP(1)H(1or2)SP(1)Cult(3)	7
	MP and H(1)H(2or3)SP(1)Cult(2or3)	19
	LP(1)Cult(2or3)	23
Total		72
142A & 177	D(1)LP(1)H(1or2)Cult(2or3)	21
	D(1or2)LP(1)Cult(2)	10
	MP(1)H(1or2)SP(1)Cult(1or2)	11
	MP(1)H(1)SP(1)Cult(3)	8
Total		50
Nebraska		
184	D(1or2)LP(1)H(1or2)Cult(2or3)	54
	D(1or2)LP(1)Cult(2or3)	20
	LP(1)H(1or2)Cult(2or3)	14
	LP(1) Cult(3)	10
Total		98
185	D(1)LP(1)H(1or2)Cult(2or3)	64
	D(1)LP(1)Cult(3)	31
Total		95
Montana		
137A	MP(1)H(2or3)SP(1)Cult(2or3)	17
	MP(1)H(3or4)SP(1)Cult(3or4)	8
	D(1)LP(1)Cult(2)	11
	LP(1)Cult(2or3)	38
Total		74
119B	MP(1)H(3or4)SP(1)Cult(1or2)	20
	MP(1)H(2or3)SP(1)Cult(3)	17
	MP(1)H(1)SP(1)Cult(4)	10
	MP and H(1)H(1)SP(1)Cult(2)	26
	MP and P(1)H(3)SP(1)Cult(1)	27
Total		100
118	MP(1)H(3or4)SP(1)Cult(1or2)	20
	MP(1)H(1or2)SP(1)Cult(2or3)	19
	MP and H(1)H(3or4)SP(1or2)Cult(2or3)	18
	MP and H(1)H(2)SP(1)Cult(2or3)	11
	LP(1)Cult(2)	26
Total		94

1/ Tillage and planting implements are abbreviated as follows: MP = moldboard plow, H = spike-tooth harrow, Spt = spring-tooth harrow, D = disk harrow, P = packer, Duft = duckfoot cultivator, SP = surface planter, LP = lister planter, Cult = cultivator.

the use of the disk harrow, duckfoot cultivator or spring-tooth harrow was quite common, but these tillage implements were not used on corn land to any great extent in other areas. Their use in the Red River Valley may be attributed to the facts that much of the land is a clay loam and that weed-infestation is perhaps more severe here than in most other areas. Spike-tooth harrowing was common in all areas on surface planted corn land. Most farmers spike-tooth harrowed 1 or 2 times after planting. In areas where lister planting was common somewhat less spike-tooth harrowing was done after planting than where surface planting was the rule.

In western Minnesota and in eastern North Dakota farmers plowed as much corn land in the fall as time would permit. In other areas spring plowing, chiefly in April and early May, was the rule.

Small Grains and Flax Grown After Row Crops

The production of small grains or flax after an intertilled crop involves less preparation of the land because the seedbed has been partially prepared through the cultivation of the intertilled crop. The common operationsemployed in preparation of the seedbed and seeding small grains and flax when grown after row crops are shown in table 6.

As corn was the principal intertilled crop on surveyed farms, small grains and flax after row crops occurred almost exclusively in areas where corn was grown.

Plowing as a tillage operation in preparing land for small grains after row crops was not practiced to any great extent. It was most common in western Minnesota and in eastern North Dakota and eastern South Dakota. Where plowing was done, a common way was to plow, spike-tooth harrow 1 or 2 times and drill. In some areas the disk harrow, spring-tooth harrow or duckfoot cultivator was used on land that had been plowed.

The disk harrow was a common implement in practically all areas in preparing a seedbed for small grains where grown after row crops. In certain areas, particularly the central Dakotas and in northwestern Nebraska, it was a common practice to disk harrow 1 or 2 times and drill. In other areas disking 1 or 2 times, spike-tooth harrowing 1 or 2 times and drilling was a usual method.

In some areas the land was drilled without any other preparation. This was particularly true where winter wheat followed a row crop.

Small Grains and Flax where Alternated with Summer Fallow

Wheat alternated with summer fallow was largely confined to Montana and certain areas of North Dakota and western Minnesota. The usual operations in preparing the seedbed for spring and winter wheat where alternated with summer fallow are shown in table 7.

Table 6 - Common practices employed in seedbed preparation and seeding small grains where grown after row crops, by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Practice followed	Proportion of acreage represented		
		Spring wheat	Oats	Barley
		Percent	Percent	Percent
Minnesota				
225A	D(1 or 2)H(1 or 2)Dr(1)	29	34	60
	Spt(1 or 2)H(1)Dr(1)	17	-	-
	D(1)Dr(1)	12	-	-
	MP(1)H(2)Dr(1)	11	-	-
	MP(1)Duft(1)H(2)Dr(1)	-	39	-
	MP(1)D(1)H(1 or 2)Dr(1)	-	-	37
Total		69	73	97
226	Spt(1 or 2)H(2)Dr(1)	63	-	-
	D(1)H(2)Dr(1)	37	-	-
Total		100	-	-
225D	Duft and H(1)H(1)Dr(1)	38	-	-
	D(1)H(1 or 2)Dr(1)	31	-	40
	Spt(1 or 2)H(1 or 2)Dr(1)	19	-	-
	MP(1)D(1 or 2)H(2)Dr(1)	4	-	22
Total		92	-	62
227A	D(1 or 2)H(1 or 2)Dr(1)	64	51	85
	MP(1)H(1 or 2)Dr(1)	30	6	-
	MP and H(1)H(1)Dr(1)	-	3	7
Total		94	60	92
227B	D (1 or 2)H(1 or 2)Dr(1)	74	68	40
	H(1 or 2)Dr(1)	16	-	17
	MP(1)D(1)H(1 or 2) Dr(1)	-	-	21
	End-gate(1)D(1)H(1 or 2)	-	15	14
Total		90	83	92
North Dakota				
225B	MP(1)Duft(1)Dr(1)	55	-	-
	Duft(1)H(1)Dr(1)	31	-	-
Total		86	-	-
173	D(1)Dr(1)	49	100	-
	MP(1)Spt(1)Dr(1)	20	-	-
	MP(1)D(1)Dr(1)	11	-	-
Total		80	100	-
174A	D(1 or 2)H(1 or 2)Dr(1)	58	70	53
	D(1)Dr(1)	14	-	4
	MP(1)H(1 or 2)Dr(1)	10	8	-
Total		82	78	57
172	D(1 or 2)Dr(1)	42	11	31
	D and Dr(1)	-	45	-
	H(1)Dr(1)	15	-	-
	D(1)H(1)Dr(1)	8	-	-
	Dr(1)	5	14	22
	MP(1)H(1)Dr(1)	-	16	19
Total		70	86	72

State and type-of-farming area	Practice followed	Proportion of acreage represented		
		Spring wheat	Oats	Barley
		Percent	Percent	Percent
North Dakota				
170	D(1 or 2)Dr(1)	44	19	58
	D(1)H(1)Dr(1)	8	-	-
	Duft(1)H(1)Dr(1)	-	-	42
	MP(1)H(1 or 2)Dr(1)	25	52	-
	MP and P(1)H(1)Dr(1)P(1)	-	29	-
Total		77	100	100
171	D(1)Dr(1)	62	-	-
	Dr(1)	16	-	-
Total		78	-	-
136	D(1 or 2)H(1)Dr(1)	24	-	-
	D and H(1)H(1 or 2) Dr(1)	15	-	-
	MP and H(1)H(2)Dr(1)	15	-	-
	MP(1)Dr(1)	11	-	-
Total		65	-	-
166	D(1 or 2)H(1 or2)Dr(1)	39	-	-
	D(1)Dr(1)	16	-	-
	MP(1)D(1)H(1)Dr(1)	27	-	-
Total		82	-	-
South Dakota				
181	MP(1)H(1 or 2)Dr(1)	40	9	26
	D(1)H(1 or 2) Dr(1)	26	23	49
	D(1)Dr(1)	-	27	-
	Duft(1)H(1)Dr(1)	-	21	-
Total		66	80	75
182A	D (1 or2)End-gate (1)H(1 or 2)	81	77	68
	D(1 or 2)Dr(1)H(1 or 2)	19	23	26
Total		100	100	94
174B	D(1)H(1 or 2)Dr(1)	35	57	77
	D(1)Dr(1)	10	-	-
	MP(1)H(1 or 2)Dr(1)	14	-	-
	End-gate(1)H(1 or 2)H(1)	5	36	15
Total		64	93	92
180	D(1 or 2)End-gate (1)H(1 or 2)	55	55	52
	Dr(1)H(1)	28	26	-
	D(1)Dr(1)H(1)	13	14	16
	Dr(1)	-	-	16
Total		96	95	84
176	Dr(1)H(1 or 2)	19	28	17
	D(1)Dr(1)H(1)	14	6	12
	D(1 or 2) End-gate (1)H(1 or 2)	13	29	33
Total		46	63	62

State and type-of-farming area	Practice followed	Proportion of acreage represented			
		Spring wheat	Winter wheat	Oats	Barley
		Percent	Percent	Percent	Percent
South Dakota					
179	D(1) Dr(1)	66	-	74	82
	Dr(1)	29	-	21	9
Total		95	-	95	91
182B	Dr(1)	52	86	36	16
	D(1 or 2)Dr(1)	22	-	40	59
	End-gate (1)D(1)	10	14	16	9
	End-gate (1)D(1 or 2) H(1)	7	-	8	14
Total		91	100	100	98
175	D and Dr(1)	27	-	14	-
	D(1)Dr(1)H(1)	22	-	8	-
	Dand Dr and H(1)	14	-	19	-
	D(1)Dr(1)	10	-	20	-
	Dr(1)	18	-	39	-
Total		91	-	100	-
142A and 177	D(1)Dr(1)	29	-	42	22
	D(1)Dr(1)H(1)	10	-	-	25
	D(1)Dr and H(1)	7	-	14	-
	Dr(1)H(1)	18	-	-	-
	Dr(1)	-	100	10	10
Total		64	100	66	57
Nebraska					
184	1-Way (1)Dr(1)	-	21	-	-
	D(1 or 2) Dr(1)	45	-	44	49
	D and Dr(1)	26	-	8	11
	D(1 or 2) H(1) Dr(1)	-	-	18	8
	Dr(1)	-	79	-	-
	End-gate (1)D(1 or 2) H(1)	12	-	21	10
	End-gate (1)D(1)	8	-	-	13
Total		91	100	91	91
185	D(1)Dr(1)	73	25	68	78
	D and Dr(1)	15	20	32	18
	Dr(1)	-	42	-	-
Total		88	87	100	96
Montana					
137A	MP(1)H(1 or 2) Dr(1)	23	-	-	-
	D(1 or 2) H (1 or 2) Dr(1)	24	-	47	-
	Dand Dr(1)H(1)	12	-	12	-
	Duft (1) H(1)Dr(1)	8	-	-	-
Total		67	-	59	-

1/ Tillage and planting implements are abbreviated as follows: MP--Moldboard plow, 1-way--Vertical disk plow, DP--disk plow, H--spike-tooth harrow, Spt--spring-tooth harrow, D--disk harrow, P--packer, L--Level, Duft--duckfoot cultivator, Dr--drill, End-gate--end-gate seeder.

Table 7 - Common practices employed in seedbed preparation and seeding wheat where alternated with summer fallow, by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Practice followed	Proportion of acreage represented by Spring wheat	State and type-of-farming area	Practice followed	Proportion of acreage represented by Spring wheat
		Percent			Percent
Minnesota			North Dakota		
225A	MP(1)D(1or2)H(1or2)Spt(1or2)Dr(1)	20	136	MP(1)D(1or2)H(1or2)Dr(1)	18
	MP(1)D(1or2)H(2)Dr(1)	13		MP(1)D(1)Dr(1)	10
	MP(1)H(2or3)Dr(1)	18		MP(1)Duft(2)H(4)Dr(1)	10
	MP(1)H(5or7)Dr(1)	15		MP(1)Duft(1)H(1)D(1)Dr and H(1)	9
				1-way and H(1)Duft(1)D and H(1)Dr(1)	9
Total		66		MP and P(1)D(1)Dr(1)	3
226	MP(1)D(3)H(1)Dr(1)	76	Total		59
	MP(1)D(1)H(2)Dr(1)	24			
Total		100	139	MP(1or2)H(1or2)Dr(1)	33
225D	MP(1)Duft(2)H(1)Dr(1)	46		MP(1)Spt(1)Dr(1)	20
	MP(2)D(1)Duft(1)H(2)Dr(1)	34		MP(1)D(1)Dr and H(1)	13
	MP(1)D(3)H(3)Dr(1)	16		MP(1)H(3)Dr(1)	12
Total		100	Total		78
North Dakota					
173	MP(1)D(3)H(1)Spt(1)Dr(1)	17	166	MP(1)D(2)Dr(1)	31
	MP(1)D(1or2)Dr(1)	13		MP(1)D(2)H(1)Dr(1)	18
	MP(1)D(1or2)Spt(1or2)Dr(1)	12		MP(1)Duft(1or2)H(1)Dr(1)	16
	MP(1)Spt(1)H(1)Dr(1)	11		MP(1)Duft(2)Dr(1)	14
	MP(1)D(1or2)H(1or2)Dr(1)	6		MP(1)D(1)Duft(1or2)Dr(1)	13
	MP(1)D(3)Dr(1)	7			
			Total		92
Total		66	Montana		
			137A	MP(1)D(1)H(2)Dr(1)	30
174A	MP(1)D(3)Dr(1)	34		MP(1)Duft(1)H(1or2)Dr(1)	15
	MP(1)D(1or2)H(1)Dr(1)	15		MP and H(1)Duft(1)H(1)Dr and H(1)	10
	MP(1)H(1or2)Dr(1)	17		MP and H(1)H(2)Dr(1)	8
	MP(1)Duft(2)H(2)Dr(1)	15		MP(1)H(4)Dr(1)	6
Total		81	Total		69
168	MP(1or2)D(2or3)H(2or3)Dr(1)	11	139B	MP(1)Duft(2or3)Dr and H(1)	22
	MP(1)D(1or2)Duft(1or2)H(1or2)Dr(1)	7		MP(1)Duft(2)Spt and Dr(1)	15
	MP(1)D(1or2)H(2)Dr(1)P(1)	6		MP(1)D(3)H(3)D and Dr and H(1)	10
	MP(1)1-way(1)Spt(1)H(2)Dr(1)	6		1-way(1)Duft and H(1) H(1) Dr(1)	18
	MP(2)1-way(1)Duft(1)H(3)Dr(3)	6			
	1-way(1or2)Duft(1or2)H(1or2)Dr(1)	13	Total		65
	1-way(2)H(1or2)Dr(1)	7			
			118	MP(1)Duft(2)Dr(1)	33
Total		56		MP(1)H(1)Dr(1)	6
				MP and H(1)Duft and H(2)W(1)Dr(1)	10
				Duft(1or2)Duft and Dr (1)	21
			Total		70

State and type-of-farming area	Practice followed	Proportion of acreage represented by Spring wheat	Proportion of acreage represented by Winter wheat
		Percent	Percent
Montana			
113	1-way(1)Duft(2)Dr and H(1)	16	—
	1-way(1)1-way and Dr(1)	5	—
	DP(1)Duft(1)Spt(1)H(1or2)Spt and Dr and H(1)	11	—
	DP(1)Duft(1)H(1)D and Dr(1)	8	—
	DP(1) D and Dr(1)	6	—
	MP(1)Duft(2)D(1)Spt and Dr(1)	6	—
Total		52	—
114	1-way(1)Duft(1or2)Duft and H(1)Dr and H(1)	8	—
	1-way(1)Duft(2)Duft and Dr and H(1)	8	—
	1-way(2)W(3)D(2or3)H(1)Dr(1)	8	—
	1-way(1)W(4)D(1)Dr(1)	6	—
	D(1)Duft(5)W and Dr(1)	9	—
	MP(1)Duft(1or2)Duft and H(1)Dr and H(1)	7	—
	DP(1)Duft(2or3)Duft and Dr(1)	6	—
Total		52	—
115	1-way(1)W(2)Dr(1)	30	14
	1-way(1)W(1)H(1)Dr(1)	17	—
	1-way(1)W(2)D and Dr and H(1)	16	—
	1-way(1)W(2)Duft and Dr and H(1)	16	—
	1-way(1)Duft(1or2)Dr(1)	—	6
	DP(1)Duft(1or2)Dr(1)	—	29
	DP(1)Duft(3or4)Dr(1)	—	28
Total		79	77
116	1-way(2or3)Dr(1)	28	10
	1-way(1or2)Duft(1or2)Dr(1)	16	19
	1-way(3)D and Dr(1)	15	—
	1-way(1)Duft and H(1)Duftand Dr(1)	9	6
	DP(1)Duft(1)Duft and Dr and H(1)	12	—
	MP(1)D(1)H(1or2)Dr(1)	—	9
	MP(1)Duft(1)D(1)Dr(1)	—	8
	MP(1)D(1)Dr(1)	—	5
Total		80	57

State and type-of-farming area	Practice followed	Proportion of acreage represented by Spring wheat	Proportion of acreage represented by Winter wheat
		Percent	Percent
Montana			
87D	MP(1)D(1or2)H(2or3)Dr(1)	34	—
	MP(1)H(1)W(3)Dr(1)	23	—
	MP(1)H(3)W(2)Dr(1)	16	—
	MP(1)H(2)Duft(2)Dr(1)	—	33
	MP(1)H(2or3)Dr(1)	—	20
	MP and H(1)H(3)Duft(1)Dr(1)	—	19
Total		73	72
88A (Irrigated)	1-way(2)D(2)H(2)L(1)Dr(1)P(1)	45	—
	MP and H(3)W(1)H(1)D(2)L(1)Dr(1)	31	—
	Duft(6)H(4)Dr(1)	24	—
	MP(1)H(1or2)Duft(4or5)L(1)Dr(1)	—	75
	MP(1)H(3)Duft(1)D(1)L(1)Dr(1)	—	25
Total		100	100
88A (Non-Irrigated)	MP(1)Duft(1or2)H(1or2)Dr(1)	9	—
	MP(1)Duft(1)H(3)D(1)Dr(1)	4	—
	MP(1)H(4) D(2)D and H(1)Dr(1)	6	—
	MP(1)H(3)D(2or3)Dr(1)	5	—
	MP(1)H(2or3)D(1or2)Dr(1)	—	11
	MP(1)H(4or5)D(2or3)Dr(1)	—	6
	1-way(3)H(3)Dr(1)	10	—
	1-way(3)H(1)Dr and H(1)	8	—
	1-way(3)H(1)Dr(1)	5	33
	DP(1)Duft(1)H(2)D(1)Dr and H(1)	4	—
	DP(1)H(4)D(1)Dr(1)	—	6
Total		51	56
120	MP(1)Duft(1or2)H(2) Dr(1)	33	—
	MP(1)Duft(1)D and H(1) Dr(1)	19	—
	MP and H(1)Duft(3)Dr(1)	20	—
	MP(1)H(1)Duft(1)Dr(1)	—	22
	MP(1)Duft and H(1)Dr(1)	—	10
	1-way(1)D(1)Duft(1)Dr(1)	—	36
	1-way(1)Duft(1)Dr(1)	—	16
Total		72	84

1/ Tillage and planting implements are abbreviated as follows: MP = moldboard plow, 1-way = vertical disk plow, DP = disk plow, H = spike-tooth harrow, Spt = spring-tooth harrow, D = disk harrow, P = packer, L = level, Duft = duckfoot cultivator, W = weeder, Dr = drill, End-gate = end-gate seeder.

The initial operation in working the summer fallow was mainly with the moldboard plow except in west-central Montana where the one-way vertical disk plow and the ordinary disk plow were substituted for the moldboard to a considerable extent.

Plowing was done mainly in June and July. The tillage operations that followed varied markedly, but the use of the duckfoot cultivator, spring-tooth harrow, and weeder to check weed growth and conserve moisture but leave the surface soil in a roughened condition to prevent soil blowing as much as possible, was much more in evidence than where wheat was seeded on non-summer-fallowed land.

Barley, oats and flax were not alternated with summer fallow to any appreciable extent but where they occupy this place in the cropping system the operations performed in working the summer fallow were quite similar to those for wheat.

Usual Planting Dates for Small Grains, Flax and Corn

The planting of small grains, flax, and corn may continue over a rather extended period depending on weather conditions and the acreage to be planted. The planting dates, as shown in figure 13, represent the usual period as reported by a majority of the farmers interviewed, but do not take into consideration variations due to differences in seasons.

Planting periods, as between areas, depend to a large extent on latitude and altitude. For example, the planting of spring wheat becomes general in southern South Dakota about March 25th and in northern North Dakota about April 15th,or 20 days later. Likewise the usual planting period for spring wheat in central North Dakota is about 10 days earlier than in an area of central Montana of about the same latitude but at a considerably higher elevation.

Production of small grains, flax and corn is to a certain degree competitive in the demands for labor and equipment. Planting of oats follows spring wheat, barley follows oats, flax follows barley, and corn follows flax. The seeding periods of spring wheat, oats, and barley are so nearly the same that an increase in one, without an increase in the labor supply, necessitates a decrease in the others.

In most cases, however, this is not a serious situation since large acreages of wheat relative to that of oats and barley are usually grown.

Common Sizes of Tillage and Planting Implements, Motive Power Units and Estimates of Rates of Work in Preparation of Seedbed and Planting Field Crops

The level to gently rolling topography which prevails on grain farms in most areas of the Northern Great Plains, together with farms of relatively large size, particularly adapts the employment of tractor power on field implements to this region. From the standpoint of least time required to perform different field operations, the implements in use should be those which, under particular soil and topographic conditions, fit the available power unit, whether it be animal power or tractor power. A fairly rapid change

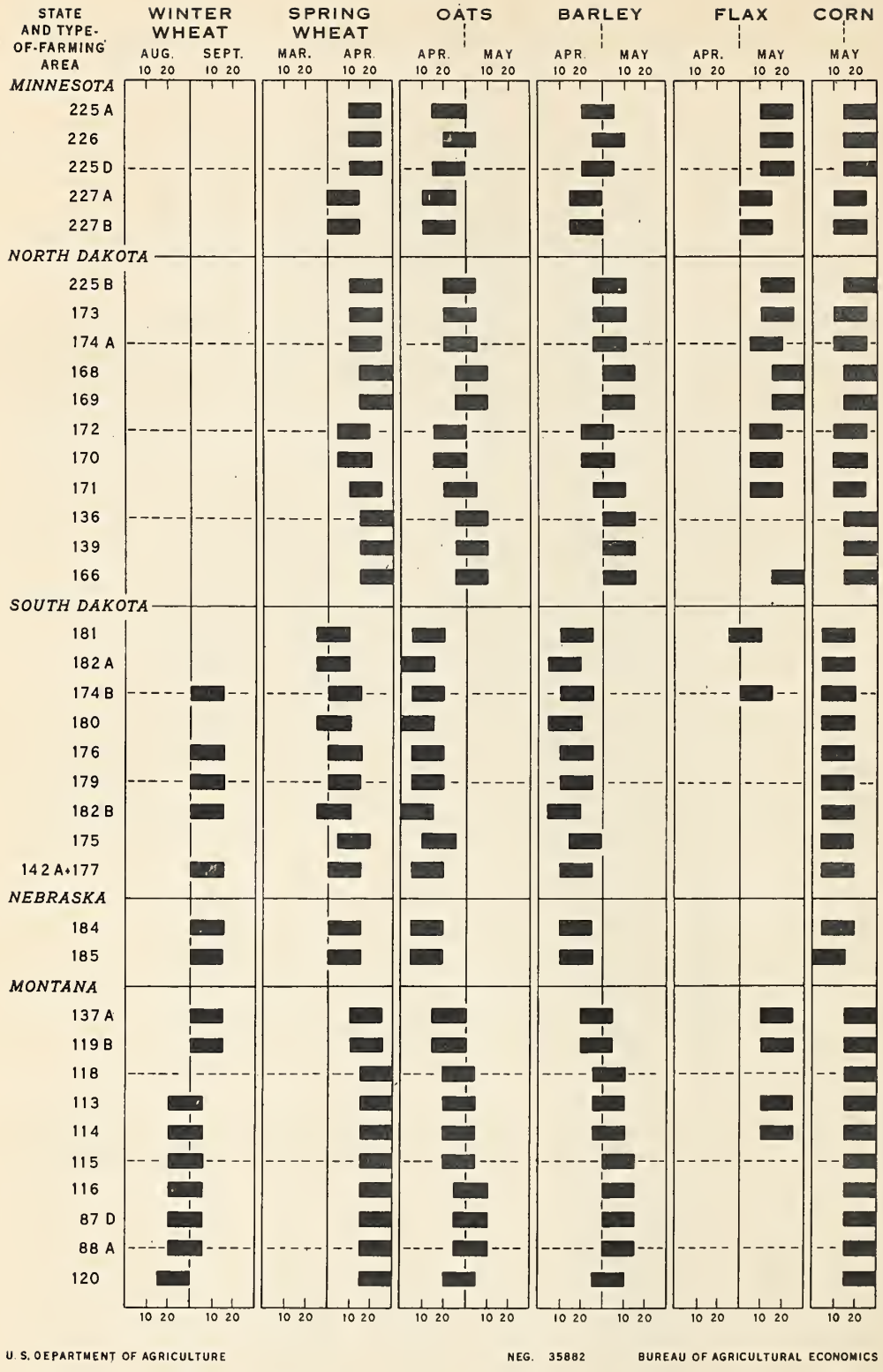

Figure 13. - Normal periods for planting small grains, flax, and corn by type-of-farming areas, Northern Great Plains

from horses to tractors has been taking place, and in some instances, horse-type equipment of improper size and type has been used with tractor power. Operators of such equipment cannot hope to equal the performance of other farmers who have implements properly related to their power units.

As previously stated the introduction of tractors mounted on rubber tires has been unusually rapid in the more easterly areas of the region. Where operating conditions are favorable, evidence points to an increase in accomplishment for certain tillage operations where tractors mounted on rubber are used. Tractor tests made by the Ohio Agricultural Experiment Station indicate that a tractor equipped with low pressure pneumatic tires has a lower rolling resistance than one having steel wheels and lugs, with the result that for certain operations a higher speed may be attained with the rubber-tired tractor or lower fuel consumption with the same implement at the same speed. 4/

Rubber tires also enable the operator to ride the tractor with greater comfort, make it possible to move equipment on hard surface roads and to operate in fields a considerable distance apart.

The Nebraska Agricultural Experiment Station reports on rubber-tired tractors as follows: 5/ " A saving in time and fuel can be made on most farm operations by using a tractor equipped with pneumatic tires. This saving becomes less significant and may become negative as drawbar pulls increase, necessitating low gear. This saving increases for those operations which make a relatively light load and permit the use of higher gears. Necessarily the tractors best adapted to rubber tires are those having sufficient speeds to utilize this advantage."

In response to an inquiry in June 1939 by the Bureau of Agricultural Economics, farmers in eastern South Dakota and in eastern North Dakota stated that most field operations that involve a relatively light load are performed in a shorter time when the rubber-tired tractor instead of the steel-wheel tractor supplied the motive power, but that planting operations and the first and second cultivation of corn were usually an exception to this rule. Some farmers stated that the use of the rubber-tired tractor did not result in a greater work accomplishment, but for the lighter loads a considerable saving in fuel was made.

The tillage and planting implements of the most common size and the motive power used to draw them are shown in tables 8 and 9. The accomplishments of these implements when drawn with horses and with tractors are shown in table 10. Although the use of certain implements drawn by tractors mounted on pneumatic tires undoubtedly has resulted in some increase in accomplishment, it is believed that the rates of work as shown for these implements are sufficiently accurate for general use.

4/ G.W. McCuen and E. A.Silver Rubber-tired Equipment for Farm Machinery, Ohio Agr. Expt. Sta. Bul. 556, p. 36, October, 1935.

5/ C. W. Smith and Lloyd W. Hurlbut. A comparative study of pneumatic tires and steel wheels on farm tractors. Nebr.Agr. Expt. Sta. Bul. 291, p. 17, September, 1934.

Table 8. - Common sizes of tillage implements and motive power used in preparation of seedbed for field crops, by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Farms surveyed	Farmers reporting the use of - Moldboard plows of - 2-bottom 12"-16" drawn with 4 horses	2-bottom 12"-16" drawn with 6 horses	2-bottom 12"-16" drawn with 6 horses	2-bottom 12"-16" drawn with 10-12 d.b. h.p. tractor 2/	3-bottom 12" - 16" drawn with 8 horses	3-bottom 12" - 16" drawn with 10-12 d.b. h.p. tractor	3-bottom 12" - 16" drawn with 15-17 d.b. h.p. tractor	3-bottom 12" - 16" drawn with 18-21 d.b. h.p. tractor	4-bottom 14"-16" drawn with 15-17 d.b. h.p. tractor	4-bottom 14"-16" drawn with 18-21 d.b. h.p. tractor	4-bottom 14"-16" drawn with 22-26 d.b. h.p. tractor	Disk Plows of - 40"-48" drawn with 15-17 d.b. h.p. tractor	Disk Plows of - 50"-60" drawn with 15-17 d.b. h.p. tractor	One-way plows of - 7' or 8' drawn with 15-17 d.b. h.p. tractor	One-way plows of - 7' or 8' drawn with 16-21 d.b. h.p. tractor	One-way plows of - 9' or 10' drawn with 15-17 d.b. h.p. tractor	One-way plows of - 9' or 10' drawn with 18-26 d.b. h.p. tractor	Spike-tooth harrows of - 15'-17' drawn with 4 horses	18'-21' drawn with 4 horses	18'-21' drawn with 5 horses	18'-21' drawn with 6 horses	18'-21' drawn with 10-14 d.b. h.p. tractor	18'-21' drawn with 15-17 d.b. h.p. tractor	22'-24' drawn with 4 horses	22'-24' drawn with 5 horses	22'-24' drawn with 6 horses	22'-24' drawn with 10-14 d.b. h.p. tractor	25'-28' drawn with 4 horses	25'-28' drawn with 6 horses	25'-28' drawn with 6 horses	25'-28' drawn with 10-14 d.b. h.p. tractor	29'-32' drawn with 15 - 17 d.b. h.p. tractor	33'-37' drawn with 15 - 17 d.b. h.p. tractor
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																																		
225A	43	5	17	4	3	-	1	9	2	1	-	2	-	-	2	1	-	1	1	4	-	-	1	-	13	10	1	2	3	8	-	-	-	-
226	16	6	4	1	2	-	1	1	1	-	-	-	-	-	-	-	-	-	2	5	-	-	-	-	2	1	-	-	2	-	1	-	-	-
225D	20	3	6	7	2	-	2	3	-	-	-	1	-	-	-	-	-	1	1	3	-	-	1	-	2	1	-	1	2	2	3	-	-	-
227A	25	2	7	2	8	-	2	4	-	-	-	-	-	-	-	-	-	-	2	9	-	1	4	1	-	-	-	-	5	1	1	-	-	-
227B	29	1	8	6	7	-	-	-	-	-	-	1	-	-	-	-	-	-	-	7	2	1	-	-	1	2	2	1	8	2	-	-	-	-
North Dakota																																		
2258	12	2	-	2	2	-	-	5	-	-	2	-	-	-	1	1	-	-	-	-	-	-	-	-	6	-	1	2	-	1	1	-	-	-
173	34	-	7	12	1	-	3	4	-	5	-	2	-	-	-	-	-	-	5	3	2	7	-	-	2	1	4	-	8	1	1	-	-	-
174A	52	1	19	8	7	-	3	10	1	1	-	-	-	-	-	-	-	-	-	7	1	-	1	-	4	2	3	4	5	4	4	2	-	-
168	40	6	9	-	1	11	-	7	2	-	-	1	-	-	4	-	4	-	-	-	-	-	-	-	7	7	1	-	1	4	2	1	2	3
169	36	2	4	2	1	13	-	5	-	4	4	2	-	-	-	-	-	-	-	1	3	1	-	-	1	3	3	-	2	5	6	-	-	-
172	55	3	20	2	2	1	-	13	-	4	-	4	-	-	-	-	-	-	2	9	2	1	-	-	14	1	3	-	6	2	1	-	-	-
170	37	5	2	3	6	-	-	11	-	1	2	1	-	-	-	-	-	-	5	7	-	-	-	-	8	1	-	-	12	-	2	-	-	-
171	48	3	7	6	7	-	-	12	4	2	-	5	-	-	-	-	-	-	2	21	1	1	-	-	5	-	3	-	2	-	-	-	-	-
136	70	2	13	6	-	-	-	19	4	12	6	2	-	-	5	1	3	1	6	6	-	4	-	-	9	-	3	-	9	3	4	-	-	-
139	19	-	1	2	2	-	2	9	-	-	-	1	-	-	-	-	-	-	-	2	-	-	-	1	2	-	1	-	2	-	1	-	1	-
166	40	1	6	1	1	-	3	24	-	5	2	8	-	-	-	-	-	-	1	2	-	-	1	-	9	2	1	-	12	3	3	-	1	3
South Dakota																																		
181	32	-	15	3	3	1	-	2	-	2	-	2	-	-	-	-	-	-	-	3	2	1	-	1	1	1	2	2	1	8	6	-	-	1
182A	27	1	6	11	3	-	-	2	-	-	-	-	-	-	-	-	-	-	1	8	2	4	1	1	1	1	-	1	-	-	6	-	-	1
174B	31	5	9	4	6	-	5	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1	2	1	6	-	5	3	4	1	5	1	-	-
180	30	1	2	7	8	-	1	1	2	-	1	1	-	-	-	-	-	-	-	14	3	2	2	-	-	-	2	1	-	-	1	1	-	-
176	41	1	4	3	5	-	10	6	-	-	2	4	-	-	-	-	-	-	-	8	-	1	5	-	3	-	1	4	1	-	-	12	-	-
179	19	-	-	-	1	-	-	-	1	-	-	-	1	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
182B	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
176	29	2	4	1	1	-	1	8	-	3	2	2	-	-	-	-	-	-	4	7	-	-	-	-	4	-	-	-	4	-	1	-	-	1
142A & 177	27	-	-	-	12	-	-	2	1	1	-	-	-	-	-	-	-	-	3	7	-	-	8	-	-	-	-	1	-	2	-	1	2	-
Nebraska																																		
184	47	3	2	1	4	-	-	8	1	3	-	-	-	-	-	-	-	-	14	9	-	1	-	2	-	-	-	-	-	-	-	-	-	-
185	22	2	-	-	5	-	2	6	3	-	-	-	-	-	1	2	-	-	7	4	-	-	2	-	-	-	-	-	-	-	-	-	1	-
Montana																																		
137A	34	-	-	9	2	3	1	12	-	1	-	-	-	-	-	-	-	-	8	11	3	3	-	-	-	-	1	-	-	-	2	1	3	-
1198	23	-	-	6	1	-	1	11	1	1	1	3	-	-	1	-	-	-	3	5	-	1	-	-	-	-	1	-	-	-	-	-	1	-
118	29	-	-	7	2	-	-	11	4	1	3	-	-	-	-	-	-	-	1	6	-	5	-	-	-	-	-	-	1	-	2	-	-	1
113	50	-	1	1	-	-	-	15	2	4	4	-	2	10	6	1	11	7	1	2	-	-	-	-	3	1	-	1	1	-	-	-	1	-
114	46	-	-	1	-	-	-	1	2	1	1	3	8	-	5	4	10	8	-	1	-	1	-	-	-	-	-	-	-	-	-	-	4	-
115	26	-	-	-	-	-	-	4	-	-	-	-	3	2	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-
116	41	-	1	2	-	-	-	-	-	-	-	-	7	4	7	-	8	5	5	1	-	-	1	3	-	-	-	-	-	-	-	-	5	-
87D	22	-	-	8	1	1	3	6	-	-	-	-	-	-	-	-	-	-	10	1	-	1	-	-	-	-	-	-	-	-	1	-	2	-
88A	42	-	7	8	2	-	-	10	1	-	-	-	4	-	4	-	3	-	1	-	-	6	1	1	-	-	4	1	-	-	-	-	6	-
120	20	-	1	3	3	1	-	7	-	-	-	-	-	-	2	-	3	-	1	3	-	1	-	1	-	-	-	-	-	-	-	-	1	-
TOTAL	1240	54	181	137	111	31	41	249	32	53	31	39	25	16	38	10	42	23	97	162	22	44	30	12	103	34	42	24	87	41	54	19	32	10

Table 8 Common sizes of tillage implements and motive power used in preparation of seedbed for field crops by type-of-farming areas, Northern Great Plains, Continued 1/

State and type-of-farming area	Farms surveyed	Spring-tooth harrows of- 9' - 14' drawn with 4 horses	Spring-tooth 9' - 14' 6 horses	Spring-tooth 9' - 14' 15-17 d.b. h.p. tractor 2/	Single disk 8' or 9' drawn with 4 horses	Single disk 8' or 9' 5 horses	Single disk 8' or 9' 15-17 d.b. h.p. tractor	Single disk 10' or 11' drawn with 4 horses	Single disk 10' or 11' 5 horses	Single disk 10' or 11' 6 horses	Single disk 10' or 11' 10-12 d.b. h.p. tractor	Single disk 17'-22' drawn with 15-17 d.b. h.p. tractor	Tandem disk 8' or 9' drawn with 9-14 d.b. h.p. tractor	Tandem disk 8' or 9' 15-17 d.b. h.p. tractor	Tandem disk 10' or 11' drawn with 9-14 d.b. h.p. tractor	Tandem disk 10' or 11' 15-17 d.b. h.p. tractor	Tandem disk 10' or 11' 18-21 d.b. h.p. tractor	Duckfoot 7' or 8' drawn with 4 horses	Duckfoot 7' or 8' 6 horses	Duckfoot 9' or 10' drawn with 6 horses	Duckfoot 9' or 10' 15-17 d.b. h.p. tractor	Duckfoot 9' or 10' 18-21 d.b. h.p. tractor	Duckfoot 11' or 12' drawn with 15-27 d.b. h.p. tractor	Duckfoot 11' or 12' 18-21 d.b. h.p. tractor	Lister 2-row drawn with 4 horses	Lister 2-row 9-14 d.b. h.p. tractor	Lister 3-row drawn with 15-17 d.b. h.p. tractor	Lister 4-row drawn with 9-14 d.b. h.p. tractor	Shovel 1-row drawn with 2 horses	Shovel 2-row drawn with 4 horses	Shovel 2-row 9-12 d.b. h.p. tractor
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																															
225A	43	-	-	1	12	3	-	5	3	1	-	-	-	-	-	-	2	2	2	6	-	-	1	-	-	-	-	-	24	3	1
226	16	-	-	-	4	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	15	-	-
225D	20	5	1	-	11	-	-	1	-	-	-	-	-	-	1	1	-	3	-	1	-	-	2	-	-	-	-	-	17	4	-
227A	25	-	-	-	4	3	1	2	1	1	2	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	5	14	1
227B	29	-	-	-	10	2	-	3	2	2	-	-	-	-	4	1	-	-	-	2	-	-	-	2	-	-	-	-	10	15	1
North Dakota																															
225B	12	-	-	-	2	-	2	-	-	-	-	-	1	1	-	1	-	3	-	-	2	-	-	1	-	-	-	-	10	-	-
173	34	2	7	3	6	-	-	1	4	7	1	1	2	-	-	3	1	-	-	1	-	-	-	-	-	-	-	-	26	2	-
174A	52	-	-	-	9	4	1	3	1	1	4	-	3	-	-	2	1	-	-	-	2	-	-	-	-	-	-	-	26	23	2
168	40	-	-	2	3	-	1	-	1	-	-	-	1	1	-	1	1	3	4	2	3	-	2	-	-	-	-	-	4	-	-
169	36	1	1	-	9	-	1	4	-	1	1	-	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	14	-	-
172	55	1	1	1	11	2	-	1	-	-	-	-	-	-	1	4	1	-	-	-	-	-	-	-	-	-	-	-	33	13	-
170	37	-	-	-	7	-	-	-	1	-	-	-	4	-	1	4	3	-	-	-	1	-	-	-	-	-	-	-	24	6	-
171	48	-	-	-	3	-	1	-	-	1	-	-	3	1	1	9	5	-	-	-	-	-	-	-	3	-	-	-	26	6	-
136	70	-	-	1	8	-	1	-	-	-	-	1	-	1	1	22	2	-	-	2	2	-	4	2	-	-	-	-	34	1	-
139	19	-	-	1	1	-	-	-	-	-	-	-	1	-	-	2	1	2	-	1	2	-	-	-	-	-	-	-	10	-	-
166	40	-	-	2	6	1	2	1	-	-	-	1	-	2	2	10	1	1	-	-	4	-	5	-	-	-	-	-	24	3	-
South Dakota																															
181	32	-	-	-	3	2	1	-	1	1	1	-	-	1	1	-	-	-	4	1	2	-	-	-	-	-	-	-	21	18	2
182A	27	-	-	-	8	1	-	-	-	11	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	23	1
174B	31	-	-	-	-	3	-	1	1	2	2	-	5	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	10	21	2
180	30	-	-	-	6	2	-	-	-	5	3	-	-	-	1	1	2	-	-	-	-	-	-	-	1	-	1	-	7	21	5
176	41	-	-	-	5	-	-	2	1	-	5	1	-	-	6	4	3	-	-	-	-	-	-	-	4	-	-	-	6	21	15
179	19	-	-	1	3	-	-	-	-	-	-	-	-	-	4	5	-	-	-	-	-	-	-	-	10	1	1	-	1	1	-
182B	26	-	-	-	9	-	1	3	2	1	1	-	3	1	-	-	-	-	-	-	-	-	-	-	22	1	-	-	-	-	-
175	29	-	-	-	4	-	1	-	-	-	-	-	1	-	2	1	-	-	-	-	-	-	-	-	2	1	-	-	12	8	-
142A & 177	27	-	-	-	1	1	-	-	-	1	2	-	10	-	3	4	1	-	-	-	-	-	-	-	3	2	1	4	3	6	6
Nebraska																															
184	47	-	-	-	11	-	2	-	-	-	-	-	3	10	3	10	-	-	-	-	-	-	-	-	30	1	7	2	3	-	-
185	22	-	-	-	4	1	-	-	-	-	-	-	1	6	-	2	1	-	-	-	-	-	-	-	18	-	1	1	-	-	-
Montana																															
137A	34	-	-	-	7	-	2	-	-	-	-	-	2	4	-	5	-	-	-	5	2	-	2	-	8	1	-	-	17	3	-
119B	23	-	-	3	-	-	-	-	-	-	-	-	-	-	-	4	1	2	-	-	4	1	1	-	-	-	-	-	9	-	1
118	29	-	-	-	2	-	-	-	-	-	-	-	1	-	1	1	-	-	1	1	5	-	3	1	-	-	-	-	8	1	-
113	50	1	-	6	-	-	-	-	-	-	-	-	2	2	-	16	2	-	-	-	17	-	7	3	-	-	-	-	6	-	-
114	46	-	-	-	-	-	1	-	-	-	-	-	-	-	-	9	6	-	-	1	5	3	8	4	-	-	-	-	-	-	-
115	26	-	-	2	—	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	3	-	3	2	-	-	-	-	-	-	-
116	41	-	-	-	-	-	-	-	-	-	-	-	-	1	2	10	2	-	-	-	8	3	3	1	-	-	-	-	4	-	-
87D	22	-	-	-	1	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88A	42	-	-	-	3	-	-	-	3	2	-	-	2	9	-	2	-	1	2	3	8	1	-	-	-	-	-	-	-	-	-
120	20	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	3	1	5	-	3	-	-	-	-	-	-	2	-
TOTAL	1240	10	10	23	179	25	19	27	21	38	24	6	47	43	37	143	40	18	16	27	76	8	44	16	101	7	11	7	413	215	37

1/ The size of implement is the working width and in some cases represents two or more implements in a combination hitch. In all cases where tractors are indicated as the source of power those of the high-wheel type were used.
2/ Drawbar horsepower tractor.

Table 9. - Common sizes of planting implements and motive power used in planting small grains, flax and corn by type-of-farming areas, Northern Great Plains 1/

State and type-of-farming area	Farms surveyed	Farmers reporting the use of -																							
		Grain drills of -														Lister planters of -					Surface planters of		
		8' or 9' drawn with 4 horses	10' or 11' drawn with -					13' or 13' drawn with -				14' or 15' drawn with -		20'-24' drawn with 15-17 d.b.h.p. tractor		2-row drawn with -				4-row drawn with 9-12 d.b.h.p. tractor			
			4 horses	6 horses	9-12 d.h.h.p. tractor 2/	15-17 d.h.h.p. tractor	18-21 d.b.h.p. tractor	4 horses	6 horses	15-17 d.h.h.p. tractor	9-14 d.b.h.p. tractor	15-17 d.b.h.p. tractor			1-row drawn with 4 horses	6 horses	9-12 d.b.h.p. tractor	15-17 d.b.h.p. tractor	1-row drawn with 2 horses	2-row drawn with 2 horses		
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																									
225A	43	1	40	-	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	2	22	-		
226	16	3	7	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-		
225D	20	-	17	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	12	-		
227A	25	3	17	-	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	22	3		
227B	29	5	23	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	27	-		
North Dakota																									
225B	12	-	11	-	2	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	7	-		
173	34	-	23	2	1	-	-	2	1	-	-	-	-	2	-	-	-	-	-	-	-	29	-		
174A	52	2	43	1	4	-	-	2	1	-	1	-	1	-	-	-	-	-	-	-	-	46	-		
168	40	-	34	-	-	2	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	4	-		
169	36	-	27	6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	13	-		
172	55	3	40	-	2	1	-	1	3	1	-	-	-	2	-	-	-	-	-	-	-	48	-		
170	37	8	26	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-		
171	48	1	38	3	-	8	2	-	-	-	-	-	-	-	-	-	-	-	3	2	-	30	-		
136	70	-	47	-	1	7	5	3	2	1	1	-	-	-	-	-	-	-	-	-	-	30	-		
159	19	1	18	-	-	3	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	7	-		
166	40	1	18	1	-	3	-	1	-	-	1	-	1	6	-	-	-	-	-	-	-	25	-		
South Dakota																									
181	38	-	22	2	1	1	-	-	1	-	2	1	-	-	-	-	-	-	-	-	-	30	-		
182A	27	-	11	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-		
174B	31	3	13	2	4	-	-	-	4	1	-	-	-	-	-	-	-	-	-	-	-	29	2		
180	30	3	7	-	5	1	-	-	1	-	-	-	-	-	-	-	1	-	1	-	-	24	1		
176	41	-	7	3	16	-	3	-	-	1	6	-	-	-	1	-	3	-	-	-	-	21	14		
179	19	2	-	-	5	3	-	-	-	-	-	-	-	6	-	3	-	5	6	-	-	1	1		
182B	26	2	5	-	3	1	-	-	1	1	-	-	-	-	-	13	1	8	2	-	-	-	-		
175	29	-	13	1	2	4	-	2	1	1	1	-	-	-	-	-	-	3	-	-	-	17	1		
142A & 177	27	-	2	1	18	1	1	-	-	-	-	-	1	1	-	1	-	9	-	-	-	13	-		
Nebraska																									
184	47	12	5	1	4	7	-	1	-	-	3	-	-	-	-	11	10	12	6	1	2	-			
185	22	3	2	2	3	-	1	-	-	-	-	-	1	-	-	-	8	7	5	-	-	-			
Montana																									
137A	34	7	16	1	-	1	-	-	1	1	1	-	5	-	-	5	2	2	-	-	20	-			
119B	23	-	2	4	1	5	-	-	2	5	-	-	2	-	-	-	-	-	-	-	9	-			
118	29	2	12	1	1	3	7	-	-	-	-	-	-	-	-	-	-	-	-	2	8	-			
113	50	-	3	2	1	17	-	-	1	2	-	-	1	-	-	-	-	-	-	-	7	-			
114	46	-	-	2	1	14	4	-	3	5	1	-	-	-	-	-	-	-	-	-	1	-			
115	26	-	2	-	-	3	-	-	1	3	-	-	1	3	-	-	-	-	-	-	3	-			
116	41	2	11	-	1	7	-	-	-	2	-	-	-	15	-	-	-	-	-	-	-	-			
87D	22	12	2	2	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	-			
88A	42	13	4	6	2	7	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-			
120	20	2	-	2	-	2	-	-	2	4	-	-	3	-	-	-	-	-	-	-	4	-			
TOTAL	1240	91	556	46	77	101	26	15	26	38	16	36	18	34	22	49	23	11	581	23					

1/ The size of implement is the working width and in some cases represents two or more implements in a combination hitch. In all cases where tractors are indicated as the source of power those of the high-wheel type were used.
2/ Drawbar horsepower tractor.

Table 10. - Estimates of rates of work in preparation of seedbed and planting field crops with implements of different kinds and sizes when drawn with horses and with tractors, Northern Great Plains

Operation	Kind and size of implement 1/	Power Unit 2/	Usual acreage covered per 10-hour day
			Acres
Plowing	2-bottom 14-inch moldboard plow	4, 5 or 6 horses	4 to 6
	2-bottom 12-and 14-inch moldboard plow	10 d.b.h.p. tractor 3/	6 to 8
	2-bottom 16-inch moldboard plow	do	7 to 9
	3-bottom 14-inch moldboard plow	8 horses	8 or 9
	do	10 or 12 d.b.h.p. tractor	9 to 12
	do	15,17,18 or 20 d.b.h.p. tractor	11 to 13
	3-bottom 16-inch moldboard plow	15 d.b.h.p. tractor	12 to 14
	4-bottom 14-inch moldboard plow	15 or 17 d.b.h.p. tractor	13 to 15
	do	18 or 20 d.b.h.p. tractor	16 to 18
	40-inch disk plow	15 d.b.h.p. tractor	10 or 11
	50-inch disk plow	do	12 or 13
	7-foot vertical disk plow	do	20 to 22
	9-foot vertical disk plow	do	26 to 28
	10-foot vertical disk plow	15 or 18 d.b.h.p. tractor	28 to 30
Harrowing	15-or 16-foot spike-tooth harrow	4 horses	25 to 30
	18-foot spike-tooth harrow	do	30 to 35
	20-foot spike-tooth harrow	4,5 or 6 horses	35 to 40
	do	10 d.b.h.p. tractor	60 to 65
	22-foot spike-tooth harrow	4 or 5 horses	40 to 45
	24-foot spike-tooth harrow	4 horses	40 to 45
	do	5 or 6 horses	45 to 50
	do	10 h.p. tractor	70 to 75
	25-and 26-foot spike-tooth harrow	4 horses	45 to 50
	do	5 or 6 horses	50 to 55
	do	10 or 15 d.b.h.p. tractor	75 to 80
	30-foot spike-tooth harrow	15 d.b.h.p. tractor	85 to 90
	32-foot spike-tooth harrow	do	95 to 100
	10-foot spring-tooth harrow	4 horses	15 to 20
	do	15 d.b.h.p. tractor	30 to 35
	12-foot spring-tooth harrow	6 horses	20 to 25
	do	15 d.b.h.p. tractor	35 to 40
Cultivating	7-or 8-foot duckfoot	4 or 6 horses	14 to 16
	9-foot duckfoot	6 horses	16 to 18
	do	15d.b.h.p. tractor	25 to 30
	10-foot duckfoot	do	30 to 35
	12-foot duckfoot	do	35 to 40
Disking	8-foot single disk harrow	4 or 5 horses	15 to 17
	9-foot single disk harrow	4 horses	18 to 20
	10-foot single disk harrow	4,5 or 6 horses	20 to 22
	do	10 d.b.h.p. tractor	30 to 35
	20-foot single disk harrow	15 d.b.h.p. tractor	60 to 65
	8-foot tandem disk harrow	10 or 15 d.b.h.p. tractor	25 to 30
	10-foot tandem disk harrow	10, 15, or 18 d.b.h.p. tractor	30 to 35
Packing	10-or12-foot packer	4 horses	20 to 25
Cultivating corn	1-row shovel cultivator	2 horses	6 to 8
	2-row shovel cultivator	4 horses	12 to 15
	do	10-d.b.h.p. tractor	20 to 25
	2-row lister cultivator	4 horses	12 to 15
	3-row lister cultivator	15 d.b.h.p. tractor	30 to 35
Planting corn	1-row lister planter	4 horses	7 to 9
	2-row lister planter	6 horses	14 to 16
	do	10d.b.h.p. tractor	18 to 20
	do	15 d.b.h.p. tractor	20 to 22
	1-row surface planter	2 horses	6 to 8
	2-row surface planter	do	12 to 15
	4-row surface planter	10 d.b.h.p. tractor	30 to 35
Drilling grain	8- or 9-foot grain drill	4 horses	15 to 18
	10-foot grain drill	4 or 6 horses	18 to 20
	do	10 d.b.h.p. tractor	30 to 32
	do	15 or 18 d.b.h.p. tractor	31 to 33
	11-foot grain drill	4 horses	20 to 22
	do	10 d.b.h.p. tractor	32 to 34
	12-foot grain drill	4 horses	22 to 24
	do	6 horses	24 to 26
	do	15 d.b.h.p. tractor	35 to 40
	14-foot grain drill	12 or 15 d.b.h.p. tractor	40 to 45
	20-foot grain drill	15 d.b.h.p. tractor	50 to 55

1/ The size of implement is the working width and in some cases represents 2 or more implements in a combination hitch.
2/ In all cases where tractors are indicated as the source of power those of the high-wheel type were used.
3/ Drawbar horsepower tractor.

There are, of course, other combinations of implements and power that differ in size from those shown in these tables, but only those that were in sufficient numbers to give a fairly reliable figure on accomplishment are shown. In certain areas, 2 or more implements were used in a combination hitch, but no attempt has been made to show the accomplishments of implements used in this way.

Plows of the moldboard type were the ones most commonly used except in north-central Montana, where ordinary disk plows and one-way vertical disk plows were used more extensively than those of the moldboard type. Plowing with horses was confined mainly to 2-bottom or smaller moldboard plows. Larger plows were drawn for the most part with tractors. A 5-horse team was the most common source of power used with 2-bottom moldboard plows and the addition of another horse to make a 6-horse team did not result in a greater work accomplishment per day. Likewise, an increase in motive power over that supplied by a 15-drawbar horsepower tractor on a 3-bottom 14-inch moldboard plow did not result in covering a greater number of acres per 10-hour day. The use of a 15-horsepower instead of a larger tractor to draw a 3-bottom 14-inch moldboard plow also resulted in a considerable saving in fuel. But the use of a 20-horsepower instead of a 15-horsepower tractor with a 4-bottom 14-inch moldboard plow resulted in an increase of about 20 percent in acres plowed per 10-hour day. Vertical disk plows were all drawn with tractors and covered about 3 acres of ground per foot of width.

Spike-tooth harrows were mainly those of from 15- to 28-foot width drawn with from 4- to 6-horse teams. The most common size was the 20-foot harrow drawn with a 4-horse team. For 20-foot spike-tooth harrows the use of a 6-horse team instead of 4 horses resulted in an increased accomplishment of only 5 percent. For spike-tooth harrows of 24-foot width or larger, an increase in size of team resulted in an appreciable increase in acres covered per 10-hour day.

Tractors of 10- and 15-drawbar horsepower were most commonly used as the source of motive power for tractor-drawn spike-tooth harrows. The use of the larger tractor on a given size of implement did not result in greater accomplishment per day. Spike-tooth harrows drawn with horses covered approximately 2 acres per 10-hour day per foot of width whereas spike-tooth harrows drawn with tractors accomplished approximately 3 acres per 10-hour day per foot of width.

Spring-tooth harrows were of minor importance. They were mainly of 10-and 12-foot widths drawn with 4- and 6-horse teams and 15-drawbar horsepower tractors.

Cultivation with the duckfoot cultivator was mainly with those of from 7- to 12-foot width, those of over 8-foot width were drawn mainly with tractors. Horse-drawn duckfoot cultivators covered approximately 2 acres per 10-hour day for each foot of width, whereas tractor-drawn implements covered about 3 acres per 10-hour day for each foot of width.

Single disk harrows were drawn almost entirely with horses, whereas tandem disk harrows were chiefly drawn with tractors. The acreage covered per 10-hour day with each type of disk of a given size where drawn with the same power unit was practically the same. A material saving of time resulted from the use of the tandem disk where it was necessary to disk the land more than once.

Small packers were used behind moldboard plows in certain areas, particularly in North Dakota. Packers not used in connection with moldboard plows were mainly those of from 9- to 12-foot width. They were drawn almost exclusively with 4 horses. An increase in width of packer resulted in an increased accomplishment per day but not always in proportion.

In central and western South Dakota and in northwestern Nebraska, corn was cultivated with the lister as well as with surface cultivators. In other areas corn cultivation was almost exclusively with the surface cultivator. The work was done with 1-, 2-, 3-, and 4-row cultivators, but 1-row cultivators drawn with 2 horses and 2-row cultivators drawn with 4 horses were by far the most common. Two-row shovel cultivators drawn with 4 horses covered approximately twice as much acreage per 10-hour day as did 1-row cultivators drawn with 2 horses.

Planting corn was with 1- and 2-row lister planters and with 1-, 2-, and 4-row surface planters. By far the greatest amount of this work was with a 2-row surface planter drawn with 2 horses, except in central and western South Dakota and in northwestern Nebraska, where corn planting with a lister planter was a common practice. The 2-row lister planter drawn with a 15-drawbar horsepower tractor accomplished about 45 percent more work in a 10-hour day than when drawn with 6 horses.

Grain drills in use were mainly those of from 8- to 20-foot width. The majority were 10-foot disk drills drawn with 4 horses. Press drills were used to a limited extent, principally in North Dakota, and deep-furrow drills were not found in appreciable numbers except in Area 115 of Montana. An increase in tractor power over the 10-horsepower tractor in connection with a 10-foot drill did not result in an appreciable increase in accomplishment per day. Horses were not used with drills of more than 12-foot width. The use of a 20-foot instead of a 12-foot drill drawn with a 15-horsepower tractor resulted in an increase in accomplishment per day of about 40 percent.

The labor and power used per 100 acres in preparing seedbed and planting small grains, flax and corn according to their place in the cropping system are given by type-of-farming areas in appendix tables 29 to 43. A summary of these labor and power requirements is shown in appendix table 44.

HARVESTING SMALL GRAINS AND FLAX

Wheat, oats, barley, and flax were harvested for grain in three different ways, namely, with the combined harvester-thresher which completes the work in one operation; with the binder and threshed from the shock with a stationary separator; and with the header and threshed from header-stacks with a stationary separator.

Proportion of Small Grain and Flax Acreage Harvested in Different Ways

Wheat was mainly harvested with the combined harvester-thresher on surveyed farms in most areas of Montana, northwestern Nebraska, and western North Dakota and South Dakota.

In western Minnesota and in eastern North Dakota and South Dakota, 77 percent or more of the wheat acreage was cut with the binder and the remainder largely harvested with the combine. In south-central and southwestern North Dakota 53 percent or more of the wheat acreage was harvested with the header (fig. 14). In many areas where grain harvest is usually with the combine it is not an uncommon practice for farmers to have an additional investment in a binder or header which may be used when the small grain crop is short and they desire to save more straw and chaff. When the acreage to be harvested is fairly large it is generally recognized that harvesting with the combine involves a lower cost than with the binder or header. Since the method of harvesting has its influence on costs and as it is not uniform from year to year perhaps harvesting costs in these drought areas should be averaged over a period of years rather than shown annually. Harvesting with binder or header savesstraw and reduces the feed bill the following year. An average for the region indicated that 50 percent of the wheat acreage was harvested with the combine, 36 percent with the binder and 14 percent with the header.

Oat harvest on surveyed farms in most areas was for the most part with the binder. In south-central and southwestern North Dakota, from 30 to about 80 percent of the oats acreage was cut with the header and the remainder largely cut with the binder. In other areas two-thirds or more of the acreage was cut with the binder. For the entire region about 92 percent of the acreage was cut with the binder, 4 percent with the header and 4 percent with the combine (fig. 15). The greater use of the binder to harvest oats is because many farmers desire to save the oats straw for feed.

Barley harvest in western Minnesota, North Dakota and in eastern South Dakota, from the standpoint of acreage harvested with the binder, header and combine followed about the same general pattern as for wheat (fig. 16). For most areas of western South Dakota, northwestern Nebraska, and Montana the acreage of barley cut with the binder was materially larger than that of wheat. For the entire region approximately 70 percent of the barley acreage was cut with the binder, 11 percent with the header and 19 percent with the combine.

Flax on surveyed farms in western Minnesota was practically all harvested with the binder. In south-central North Dakota harvest of flax with the header was the common method. In other areas of North Dakota 55 percent or more of the flax acreage was cut with the binder and the remainder harvested with the combine. In eastern South Dakota harvest of flax with the binder was by far the most common method. In other areas of South Dakota, Nebraska, and Montana flax was grown to only a limited extent. In these areas

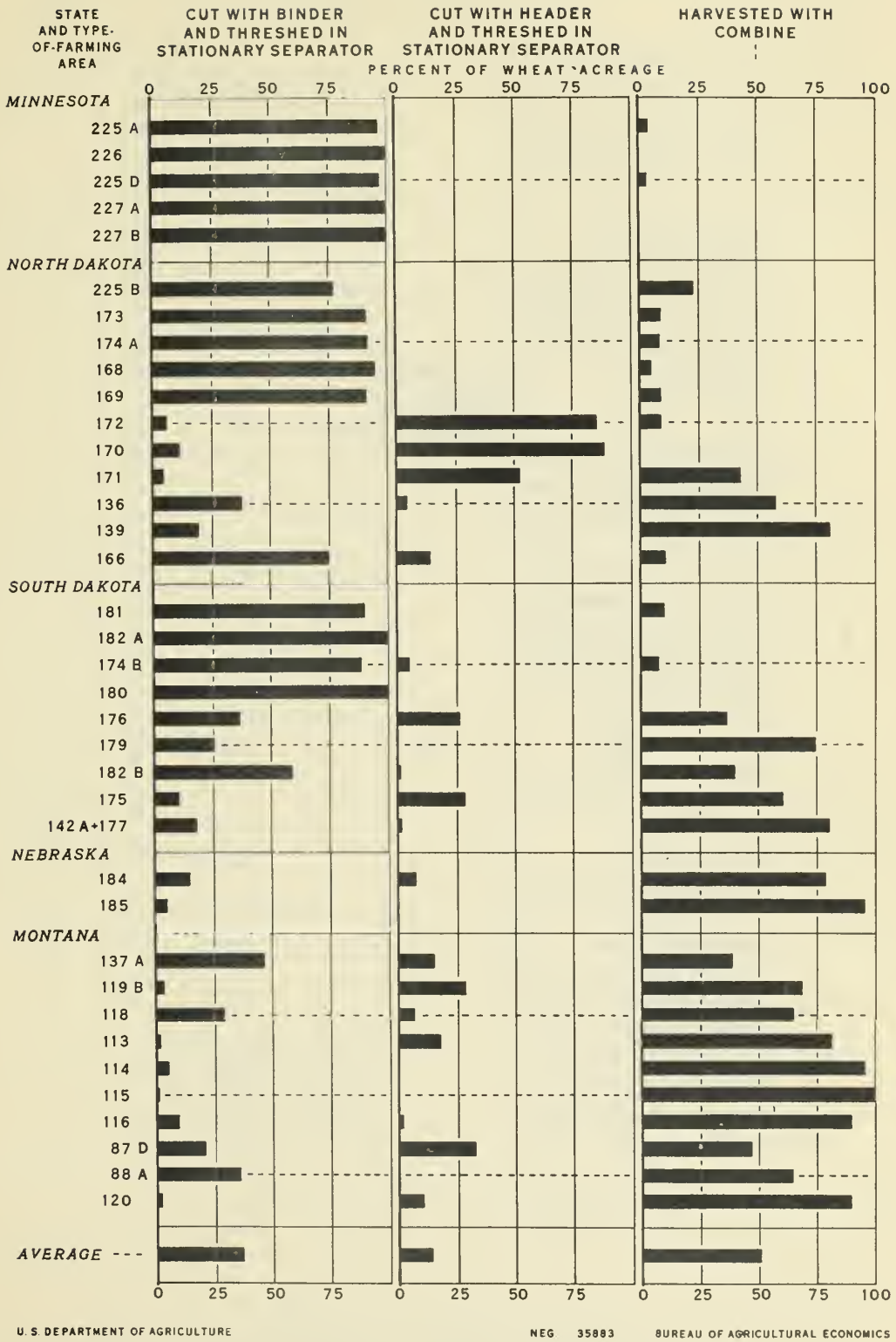

Figure 14. - Proportion of wheat acreage harvested by different methods on surveyed farms by type-of-farming areas, Northern Great Plains, 1933

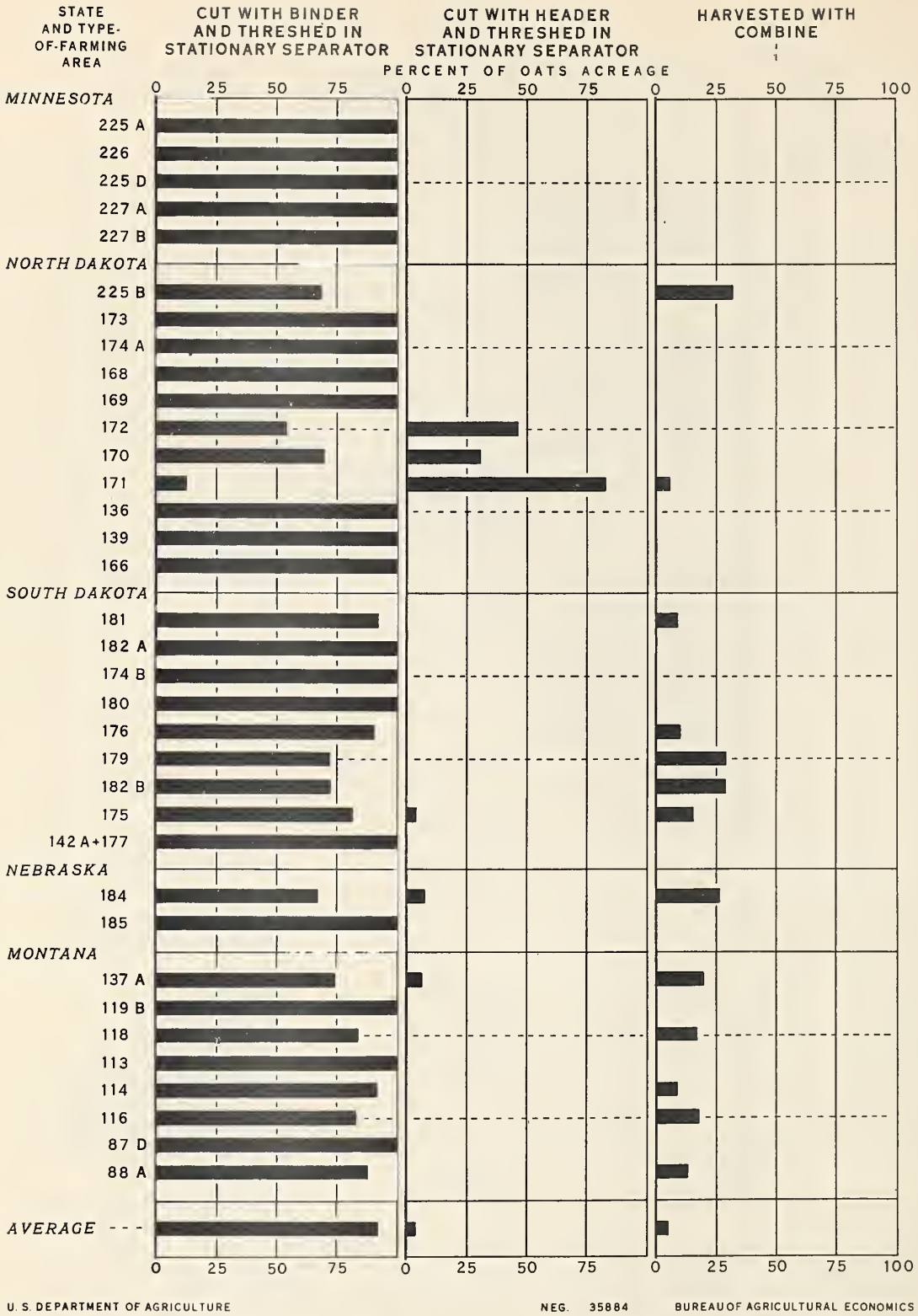

Figure 15. - Proportion of oats acreage harvested by different methods on surveyed farms by type-of-farming areas, 1933

Figure 16. - Proportion of barley acreage harvested by different methods on surveyed farms by type-of-farming areas, Northern Great Plains, 1933

where flax occurred, the combine method of harvesting was the most common. For the entire region about two-thirds of the flax acreage was cut with the binder, 25 percent with the combine and 8 percent with the header.

Harvesting with the Combined Harvester-Thresher

A survey of harvest labor in North Dakota in 1938 ihdicates that the small combine (5- and 6-foot cutter-bar widths) is being used to a considerable extent in certain areas of eastern North Dakota. 6/

Of 201 Cass County farms surveyed in area 174A, 10 percent had combines of 5- or 6-foot cutter-bar widths. Of 227 Walsh County farms surveyed in area 225A, 7 percent had combines of 5- or 6-foot cutter-bar widths. In both areas other combines were mainly of 10- and 12-foot cutter-bar widths. According to this survey, combines of less than 6-foot cutter-bar widths were not used to any appreciable extent in other areas of North Dakota in 1938..

These small combines harvested an average of 119 acres of small grains and flax per combine of which 67 percent was represented by wheat; 5 percent by oats; 20 percent by barley; 5 percent by rye and 3 percent by flax. They were all mounted on pneumatic tires and drawn with tractor power. With the 5-foot combine a crew of 2 men, 1 man to operate the combine and the tractor and 1 man to haul the grain away in a truck, harvested and stored small grain at the rate of 15 to 17 acres per 10-hour day.

Harvesting wheat with the combine has become an established practice in the more westerly areas of the Northern Great Plains (table 11). In the western Dakotas and in the areas surveyed in northwestern Nebraska and in Montana, with the exception of areas 87D and 137A in Montana, from 23 to 85 percent of the farmers interviewed had combines. For the region as a whole, 22 percent of the farm operators interviewed had one or more combines.

In order to warrant the purchase of the larger combine a rather substantial acreage of grain is needed. The crop acreage per farm for surveyed farms that had combines averaged approximately 746 acres per farm compared with 339 acres per farm for farms without combines, or the average crop acreage per farm was 120 percent larger for farms with than for farms without combines. In combine areas on farms so small that the owners did not consider that they had sufficient acreage to warrant the purchase of a combine, it was a common practice to hire the grain harvested with a combine on a contract basis.

6/ Cooperative survey made by the Farm Security Administration, Bureau of Agricultural Economics and the North Dakota Agricultural Experiment Station. Unpublished data in files of the Agricultural Experiment Station.

Table II. - Proportion of farms with and without combines and crop acreage per farm, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms with combines		Farms without combines	
	Farms	Crop area per farm	Farms	Crop area per farm
	Percent	Acres	Percent	Acres
Minnesota				
225A	2.3	316	97.7	305
226	-	-	100.0	160
225D	5.0	1,050	95.0	293
227A	-	-	100.0	245
227B	-	-	100.0	201
North Dakota				
225B	16.7	523	83.3	428
173	2.9	695	97.1	376
174A	-	-	100.0	375
168	2.5	585	97.5	509
169	2.8	640	97.2	496
172	5.5	540	94.5	335
170	5.4	322	94.6	280
171	22.9	685	77.1	358
136	28.6	659	71.4	330
139	52.6	581	47.4	322
166	10.0	596	90.0	488
South Dakota				
181	3.1	830	96.9	294
182A	-	-	100.0	208
174B	3.2	362	96.8	382
180	-	-	100.0	279
176	12.2	1,056	87.8	515
179	36.8	859	63.2	307
182B	11.5	761	88.5	306
175	27.6	798	72.4	365
142A-177	44.4	562	55.6	352
Nebraska				
184	38.3	558	61.7	224
185	45.5	1,089	54.5	312
Montana				
137A	14.7	479	85.3	317
119B	34.8	1,054	65.2	368
118	48.3	409	51.7	334
113	68.0	866	32.0	409
114	63.0	674	37.0	319
115	84.6	1,241	15.4	288
116	43.9	666	56.1	331
87D	9.1	1,104	90.9	236
88A	35.7	579	64.3	276
120	40.0	835	60.0	271
Average	22.3	746	77.7	339

Common Sizes of Combines, Motive Power Units, Labor Crews and Rates of Harvest Work

The most common size of combines and motive power used to draw them are shown by type-of-farming areas in table 12. Combines varied in size from 8- to 24-foot cutter-bar widths, with a tendency for the larger sizes to appear most frequently in those areas having the largest wheat acreage per farm. The 12-foot cutter-bar combine was the most common size, and was followed in order by those of 16-and 15-foot cutter-bar widths. All combines included in the survey except one were drawn with tractors. The high-wheel 15-drawbar horsepower tractor was the most common size used to draw combines of all sizes except the 24-foot combine. Twenty-four foot combines were drawn with 50-horsepower track-laying tractors.

The grain was all bulked. An operating crew of two men, one man on the tractor and one man on the combine was usual for most combines. Of the combines represented in the survey, 92 percent were operated with a 2-man crew, 3 percent, mainly of the smaller sizes, were operated with a 1-man crew, and 5 percent, mainly of the larger sizes, were operated with a 3-man crew. The rates of work with combines of different sizes when drawn with designated power units are given in table 13. The acreage of grain cut per 10-hour day was about $2\frac{1}{2}$ times the cutter-bar width.

Table 13. - Estimates of rates of work in harvesting small grains with combines of different sizes, Northern Great Plains

Size of combine (Length of cutter-bar)	Power unit (drawbar horsepower rating)	Usual acreage per 10-hour day
		Acres
10-foot combine	15 h.p. high-wheel tractor	20 to 25
12-foot combine	15 or 18 h.p. high-wheel tractor	25 to 30
15-foot combine	15 h.p. high-wheel tractor	30 to 35
16-foot combine	15 or 18 h.p. high-wheel tractor	32 to 37
20-foot combine	15 or 18 h.p. high-wheel tractor	40 to 45
24-foot combine	50 h.p. track-type tractor	50 to 55

The labor used in hauling grain from the combine depends upon the threshing rate, the distance hauled and whether the work is done with horses or motor trucks. Delivery of grain to the elevator with motor trucks was the common method in most areas. Combines are equipped with grain tanks and the grain is delivered direct from the grain tank into the motor truck. With normal yields, 1 man with a motor truck of 100-bushel capacity can haul the grain that would be harvested with a 16-foot combine, providing the distance does not exceed 5 or 6 miles. The capacity of the motor truck usually exceeds that of the grain tank. To insure against delay in emptying the grain tank an extra man with team and wagon is sometimes used to store the grain until the motor truck returns from the elevator. Where this is the case 1 motor truck can deliver the grain a distance of 10 or 12 miles. For longer hauls 2 or more motor trucks are usually required.

Table 12.--Common sizes of combines and motive power used in harvesting small grains and flax, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms surveyed	Farmers reporting the use of combines of-															
		10-foot drawn with		12-foot drawn with			15-foot drawn with		16-foot drawn with			20-foot drawn with			24-foot drawn with		
		8-12 d.b.h.p. tractor 1/	15-17 d.b.h.p. tractor 1/	8-12 d.b.h.p. tractor 1/	15-17 d.b.h.p. tractor 1/	18-21 d.b.h.p. tractor 1/	15-17 d.b.h.p. tractor 1/	18-21 d.b.h.p. tractor 1/	15-17 d.b.h.p. tractor 1/	18-21 d.b.h.p. tractor 1/	21-28 d.b.h.p. tractor 1/	15-17 d.b.h.p. tractor 1/	18-21 d.b.h.p. tractor 1/	50 d.b.h.p. tractor 2/			
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																	
225A	43	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-
225D	20	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
North Dakota																	
225B	12	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
173	34	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
174A	52	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
168	40	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
169	36	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
172	55	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-
171	48	-	1	-	4	2	2	-	3	1	1	-	-	-	-	-	-
136	70	1	1	-	16	3	-	1	-	4	2	-	-	-	-	-	-
139	19	-	1	1	8	2	-	-	1	1	1	-	-	-	-	-	-
166	40	-	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota																	
181	32	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
174B	31	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-
176	41	1	-	1	-	-	-	-	1	3	-	-	-	-	-	-	-
179	19	1	-	1	1	-	-	-	5	-	-	-	-	-	-	-	-
182B	26	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-
175	29	-	-	-	3	-	-	-	1	1	-	-	1	1	-	-	-
142A& 177	27	4	-	4	6	-	-	-	-	-	-	-	1	-	-	-	-
Nebraska																	
184	47	-	3	1	11	1	1	-	2	-	-	-	-	-	-	-	-
185	22	-	-	5	5	1	1	2	3	1	-	-	-	-	-	-	-
Montana																	
137A	34	-	-	-	9	1	-	1	-	-	1	-	-	-	-	-	-
119B	23	-	-	-	8	-	-	-	-	1	-	1	-	-	-	-	-
118	29	-	4	-	5	2	1	2	1	1	-	-	-	-	-	-	-
113	50	-	-	1	17	3	2	1	12	2	-	-	1	-	-	-	-
114	46	-	-	-	9	3	3	-	9	4	4	1	2	-	-	-	-
115	26	-	2	-	3	-	2	-	3	2	1	-	-	-	-	-	3
116	41	-	-	-	6	1	7	-	8	3	-	2	2	-	-	-	1
87D	22	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
88A	42	-	8	-	5	2	1	-	1	-	-	-	-	-	-	-	-
120	20	-	-	-	6	2	-	-	3	-	-	-	-	-	-	-	-
Total	1076	7	25	16	133	25	22	7	54	27	10	5	6	4			

1/Drawbar horsepower high-wheel tractor. 2/Drawbar horsepower track-laying tractor.

The labor and power used per 100 acres in harvesting and hauling small grains and flax where harvested with the combine are shown by type-of-farming areas in appendix tables 45 to 48.

Acreage of Grain Cut Annually by Combines

The distribution of combines by total acres cut annually and by size of machine is shown in table 14. Sixty-eight percent of the 12-foot combines cut 400 or fewer acres annually, whereas 61 percent of the 16-foot combines cut over 400 acres annually. For combines of all sizes 37 percent cut 300 or fewer acres; 46 percent cut from 301 to 700 acres and 17 percent cut over 700 acres annually.

Table 14. - Distribution of combines of different sizes according to acreage of grain cut annually, Northern Great Plains, 1933

Acres of grain cut annually	Size (length of cutter-bar)									
	8-foot	10-foot	12-foot	14-foot	15-foot	16-foot	18-foot	20-foot	24-foot	Total
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
100 and under	1	1	2	-	1	1	-	-	-	6
101 to 200	1	7	21	2	4	-	-	-	-	35
201 to 300	1	4	36	3	5	12	-	-	-	61
301 to 400	-	6	23	-	2	14	-	2	-	47
401 to 500	-	-	13	1	7	12	1	-	-	34
501 to 600	-	-	8	1	2	9	-	3	-	23
601 to 700	-	-	9	-	1	5	-	5	-	20
701 to 800	-	1	3	-	3	6	-	1	-	14
801 to 900	-	-	5	-	-	2	-	1	-	8
901 to 1000	-	-	-	-	2	3	-	2	1	8
1001 to 1100	-	-	-	-	-	1	-	-	-	1
1101 to 1200	-	-	-	-	-	5	-	2	1	8
1201 to 1300	-	-	-	-	-	-	-	1	1	2
1301 to 1400	-	-	1	-	-	-	-	-	-	1
1401 to 1500	-	-	-	-	-	-	-	3	-	3
1501 and over	-	-	-	-	-	-	1	-	1	2
Total	3	19	121	7	27	70	2	20	4	273

Harvesting with Binder and Header and Threshing with the Stationary Separator

Harvesting of wheat, oats, barley, and flax with binders and headers and threshing in stationary separators was practically all done in 2 different ways, namely, harvesting with the binder and threshing bundle grain from shock, and harvesting with header and threshing headed grain from stack.

Common sizes of grain binders and headers and motive power are shown in table 15. Seven- and 8-foot binders were most common and were for the most part drawn with 4-horse teams. Headers were largely of 12-foot cutter-bar widths and were mainly propelled with 4- and 6-horse teams.

Table 15. - Common sizes of grain binders and headers, and motive power used in harvesting small grains and flax, by types of farming areas, Northern Great Plains

State and type-of-farming area	Farms surveyed	Farmers reporting the use of: 6-foot binders drawn with 4 horses	7-foot binders drawn with 4 horses	8-foot binders drawn with: 4 horses	8-foot binders drawn with: 10-14 d.b.h.p. tractor 1/	8-foot binders drawn with: 15-17 d.b.h.p. tractor 1/	10-foot binders drawn with: 10-14 d.b.h.p. tractor 1/	10-foot binders drawn with: 15-17 d.b.h.p. tractor 1/	12-foot headers propelled with: 4 horses	12-foot headers propelled with: 6 horses	12-foot headers propelled with: 10-14 d.b.h.p. tractor 1/
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota											
225A	43	-	18	19	2	-	-	-	-	-	-
226	16	1	8	6	-	-	-	-	-	-	-
225D	20	1	9	10	-	-	-	1	-	-	-
227A	25	-	-	13	2	-	4	-	-	-	-
227B	29	3	7	13	5	-	-	-	-	-	-
North Dakota											
225B	12	-	7	1	1	-	-	-	-	-	-
173	34	-	2	24	-	2	-	6	-	-	-
174A	52	-	6	37	3	-	1	1	-	-	-
168	40	-	3	35	1	-	-	1	-	-	-
169	36	-	6	27	1	-	-	5	-	-	-
172	55	-	-	20	-	4	-	-	23	12	1
170	37	2	1	18	-	-	-	2	11	12	2
171	48	-	-	13	-	-	-	-	19	15	-
136	70	-	11	40	-	2	-	3	-	-	-
139	19	-	-	8	1	1	-	2	-	-	-
166	40	-	-	26	2	4	-	8	-	-	-
South Dakota											
181	32	-	12	11	-	-	-	5	-	-	-
182A	27	-	-	18	2	1	-	1	-	-	-
174B	31	-	1	18	6	1	3	-	1	-	-
180	30	-	-	21	2	-	1	1	-	-	-
176	41	-	-	9	6	-	12	2	4	-	9
179	19	-	-	3	3	2	2	1	-	-	-
182B	26	-	-	13	1	-	6	1	-	-	-
175	29	-	-	10	-	1	-	2	9	4	-
142A & 177	27	-	-	7	5	1	4	1	-	-	-
Nebraska											
184	47	-	-	14	6	4	4	1	5	-	-
185	22	-	-	7	-	3	1	3	-	-	-
Montana											
137A	34	-	4	20	-	-	-	-	-	4	-
119B	23	-	3	6	-	1	-	1	1	5	-
118	29	-	-	15	1	-	-	1	-	-	-
113	50	-	-	8	-	2	-	2	4	4	-
114	46	-	-	12	-	2	-	-	-	-	-
115	26	-	-	2	-	-	-	-	-	-	-
116	41	-	-	10	-	-	-	-	-	-	-
87D	22	1	6	3	-	1	-	-	-	-	-
88A	42	6	5	14	-	-	-	-	-	-	-
120	20	1	-	2	-	-	-	-	4	3	-
Total	1,240	15	109	533	50	32	38	51	81	59	12

1/ Drawbar horsepower high-wheel tractors.

Rates of work for the operations in harvesting small grains and flax with the binder and header are shown in table 16. All of these operations are influenced to some extent by the yield of grain and straw. The acreage of grain harvested per day with the binder increased about in proportion to the increase in size of binder used. The use of tractor power instead of horsepower increased the rate of work by about 35 percent.

Table 16. - Operations, kind and size of implements, size of crew, motive power and rates of work in harvesting wheat, oats, barley and flax for grain, Northern Great Plains

Operation	Kind and size of implement	Crew (men)	Power unit		Usual acreage per 10-hour day
			Horses	Tractor (drawbar rating)	
		Number	Number	Size	Acres
Cutting	6-foot binder	1	4	-	10 to 12
do	7-foot binder	1	4	-	14 to 16
do	8-foot binder	1	4	-	15 to 18
do	do	2	-	10 or 15 horse-power	20 to 25
do	10-foot binder	2	-	10 or 15 horse-power	25 to 30
Shock					
Wheat		1	-	-	16 to 18
Barley		1	-	-	15 to 17
Oats		1	-	-	14 to 16
Flax		1	-	-	15 to 17
Cutting and stacking headed grain	12-foot header and 2 barges	5 1/	8 1/	-	20 to 25
do	do	5 2/	10 2/	-	25 to 30
do	do	6 3/	4 3/	10 horsepower	28 to 32

1/ Includes 1 man and 4-horse team on header and 4 men and 2 2-horse teams to haul and stack.
2/ Includes 1 man and 6-horse team on header and 4 men and 2 2-horse teams to haul and stack.
3/ Includes 2 men to operate header and 4 men and 2 2-horse teams to haul and stack.

Where a 4-horse team was used to propel the header, a number of farmers used one header barge with a crew of 2 men and a 2-horse team to stack the headed grain. One barge was used only when yields were light. The acreage cut and stacked per day was about 20 percent less than when 2 barges were used. Practically all farmers that used a 6-horse team or tractor motive power to propel the header, hauled and stacked the headed grain with 2 barges with a 2-horse team for each barge, and a crew of 4 men. The common size of separators and threshing outfits where headed grain was threshed from the stack and where bundle grain was threshed from the shock is shown by type-of-farming areas in tables 17 and 18. Separators were largely of 22-inch and 28-inch cylinder capacity.

Table 17. - Common size of separators and labor crews where headed grain was threshed from stack, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Farms surveyed	Farmers reporting the use of a 22-inch cylinder separator operated by 3 men	22-inch cylinder separator operated by 4 men	22-inch cylinder separator operated by 5 men	22-inch cylinder separator operated by 6 men	24-inch cylinder separator operated by 4 men	24-inch cylinder separator operated by 5 men	24-inch cylinder separator operated by 6 men	26-inch cylinder separator operated by 5 men	26-inch cylinder separator operated by 6 men	28-inch cylinder separator operated by 4 men	28-inch cylinder separator operated by 5 men	28-inch cylinder separator operated by 6 men	32-inch cylinder separator operated by 4 men	32-inch cylinder separator operated by 5 men	32-inch cylinder separator operated by 6 men	32-inch cylinder separator operated by 8 men
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
North Dakota																	
169	36	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
172	55	1	1	-	-	-	-	-	1	-	9	8	4	-	3	2	1
170	37	-	3	5	1	1	-	1	2	-	1	1	2	2	-	-	-
171	48	4	5	-	1	-	-	-	1	2	-	5	13	-	1	1	-
136	70	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1
166	40	1	1	2	-	-	-	-	-	-	-	-	1	-	-	-	-
South Dakota																	
174B	31	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
176	41	-	-	1	-	1	-	-	-	-	3	3	2	-	1	1	-
175	29	-	1	1	1	-	-	-	-	1	2	2	1	-	-	-	1
142A & 177	27	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Nebraska																	
134	47	1	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-
Montana																	
137A	34	-	-	-	3	-	1	-	-	-	-	1	1	-	-	-	-
119B	23	-	1	1	1	-	-	2	-	-	-	3	-	-	-	-	-
118	29	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
113	50	-	1	-	-	-	1	-	-	1	-	6	-	-	-	-	-
116	41	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
87D	22	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
120	20	-	-	2	-	-	-	-	-	-	-	-	3	1	1	-	-
Total	680	8	13	14	7	2	4	3	5	4	18	30	30	2	6	4	3

Table 18.-Common size of separators, labor crews and motive power where bundle grain was threshed from shock, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Farms surveyed	Farmers reporting the use of a: 22-inch cylinder separator with 5 men and 8 horses	22-inch cylinder separator with 6 men and 8 horses	22-inch cylinder separator with 6 men and 10 horses	22-inch cylinder separator with 7 men and 12 horses	22-inch cylinder separator with 8 men and 12 horses	26-inch cylinder separator with 7 men and 12 horses	26-inch cylinder separator with 8 men and 12 horses	28-inch cylinder separator with 7 men and 12 horses	28-inch cylinder separator with 8 men and 12 horses	28-inch cylinder separator with 9 men and 12 horses	28-inch cylinder separator with 9 men and 14 horses	28-inch cylinder separator with 9 men and 16 horses	28-inch cylinder separator with 10 men and 16 horses	32-inch cylinder separator with 8 men and 12 horses	32-inch cylinder separator with 9 men and 16 horses	32-inch cylinder separator with 10 men and 16 horses	32-inch cylinder separator with 12 men and 20 horses
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																		
225 A	43	1	--	--	2	--	1	--	11	1	1	2	3	6	--	--	3	--
226	16	2	2	1	--	--	--	--	1	--	--	--	2	--	--	--	--	--
225 D	20	--	--	1	--	1	--	1	2	3	--	--	4	2	--	--	--	--
227 A	25	1	--	4	--	--	1	1	2	--	--	--	4	--	--	1	1	1
227 B	29	--	--	--	--	--	--	1	1	1	--	--	2	3	--	2	--	--
North Dakota																		
225 B	12	1	2	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--
173	34	--	--	--	--	--	--	--	1	14	3	--	--	--	1	1	1	--
174 A	52	2	--	--	1	1	--	1	2	5	1	1	3	--	--	--	1	--
168	40	--	--	1	--	--	--	--	--	7	5	4	--	2	--	1	2	--
169	36	--	--	--	--	--	--	--	--	8	2	5	--	3	--	--	--	--
172	55	3	2	--	--	--	--	--	1	5	1	--	--	--	2	--	1	--
170	37	1	--	1	--	--	--	--	--	2	--	1	1	1	--	--	--	--
171	48	1	--	--	--	--	--	--	--	3	--	--	1	--	1	--	--	--
136	70	2	--	--	3	1	--	2	3	5	--	--	--	3	1	1	--	--
139	19	2	--	2	--	--	--	--	--	2	2	--	--	--	1	2	3	2
166	40	8	--	2	--	--	--	--	2	5	2	2	1	--	--	--	--	--
South Dakota																		
181	32	1	--	1	3	--	--	--	5	1	--	--	2	2	--	--	4	--
182 A	27	1	--	--	1	1	--	--	--	--	--	--	1	1	--	--	--	1
174 B	31	7	1	--	--	3	--	--	4	6	--	--	1	2	--	--	1	--
180	30	2	1	1	--	3	--	--	1	2	--	--	--	8	--	--	3	1
176	41	--	--	--	1	--	1	--	2	6	1	1	1	5	4	--	2	--
179	19	--	--	1	1	--	1	3	--	--	--	--	1	1	--	--	--	--
182 B	26	--	3	--	--	--	--	1	--	3	1	--	3	6	2	--	1	--
175	29	--	--	--	--	--	--	--	2	3	--	1	1	1	--	--	--	--
142 A & 177	27	--	1	--	--	--	1	1	3	--	--	1	1	1	--	--	1	--
Nebraska																		
184	47	2	--	--	1	2	1	1	--	3	--	--	--	6	--	--	--	--
185	22	--	--	--	--	--	--	1	--	--	--	--	--	3	--	--	--	--
Montana																		
137 A	34	2	--	--	--	--	--	--	1	3	1	1	1	5	--	--	--	--
119 B	23	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--
118	29	--	--	--	1	--	--	--	--	--	--	--	1	--	--	1	1	--
113	50	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
114	46	2	--	--	--	1	--	--	--	1	--	--	--	1	--	--	1	--
115	26	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--
116	41	--	--	--	--	--	--	--	--	--	--	--	--	2	2	--	1	--
87 D	22	--	--	1	--	1	--	--	--	--	--	3	2	--	--	--	--	--
88 A	42	--	--	--	--	--	--	--	2	4	--	2	--	5	--	--	--	--
120	20	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	1	--
Total	1240	42	12	17	14	14	5	13	49	94	20	21	38	72	14	9	28	5

A typical crew with a 22-inch cylinder separator where headed grain was threshed from the stack consisted of 4 or 5 men while the 28-inch cylinder separator was operated with 4, 5, or 6 men. Where bundle grain was threshed from the shock, a typical crew with the small separator consisted of 4 men with teams to haul in the bundles and 1 or 2 men at the machine. The 28-inch and 32-inch cylinder separators were typically operated with crews of 8 or 10 men with 6 or 8 men with teams hauling bundle grain and 2 men at the machine. The rates of work where headed grain was threshed from the stack are given in table 19 and where bundle grain was threshed from the shock in table 20.

Table 19. - Estimates of rates of work in threshing headed grain from stack with separators of designated sizes and designated labor crews, Northern Great Plains.

Crop	Yield per acre	Separator (size of cylinder)	Crew (men)	Threshing rate per 10-hour day
	Bushels	Inches	Number	Bushels
Wheat	4.9	22	5	446
Wheat	5.4	28	4	550
Wheat	6.1	28	5	690
Wheat	5.6	28	6	624
Barley	7.3	28	4	530
Barley	14.9	28	5	950
Barley	6.6	28	6	705

Grain, threshed in a stationary separator, was delivered direct from the separator, either into a wagon box or motor truck. Where wheat was hauled direct to the elevator the motor truck was commonly used and the rate of delivery was somewhat faster than when hauled direct from the combine to the elevator. Because of higher yields and a more bulky product the labor requirement for delivery of barley and oats was somewhat higher than that of wheat. Two wagons were commonly used for farm storage of grain with 1 man and 2-horse team for each wagon.

The labor and power used per 100 acres in harvesting, threshing and hauling wheat, oats, barley, and flax where cut with binder and header and threshed in the stationary separator are shown by type-of-farming areas in appendix tables 49 to 56. A summary of these labor and power requirements is given in appendix table 57.

Table 20. - Estimates of rates of work in threshing bundle grain from shock, with separators of designated sizes and designated labor crews and power units, Northern Great Plains

Crop	Yield per acre	Separator (size of cylinder)	Crew (men)	Power unit (horses)	Threshing rate per 10-hour day
	Bushels	Inches	Number	Number	Bushels
Wheat	8.0	22	5	8	450
"	10.6	28	7	12	726
"	8.9	28	8	12	730
"	13.3	28	10	16	743
"	12.7	32	10	16	975
Oats	28.3	22	5	8	811
"	31.6	28	7	12	1,334
"	18.8	28	8	12	1,303
"	22.0	28	10	16	1,182
"	20.2	32	10	16	1,596
Barley	26.2	22	5	8	837
"	22.9	28	7	12	1,022
"	20.4	28	8	12	1,126
"	18.6	28	10	16	1,006
"	21.2	32	10	16	1,245
Flax	5.2	22	5	8	324
"	6.0	28	8	12	313
"	8.3	28	10	16	422

HARVESTING CORN

Corn was harvested in a number of different ways. The several methods included husking from standing stalks; cutting with the corn binder; harvesting with the corn picker; cutting with the grain binder; cutting with the corn sled; cutting by hand and harvesting with livestock. Husking from standing stalks and cutting with the corn binder were by far the most common methods.

In southwestern Minnesota, from 50 to 70 percent of the corn acreage was husked from standing stalks and the remainder largely cut with the corn binder. In other areas of western Minnesota, 80 percent or more of the corn acreage was cut with the corn binder.

In North Dakota, with the exception of areas 168, 169, 136, and 166, 65 percent or more of the corn acreage was cut with the corn binder and the remainder largely husked from standing stalks. In areas 168 and 169, about one-half of the corn acreage was husked from standing stalks and about one-half cut with the corn binder. In areas 136 and 166, 55 percent or more of the corn acreage was cut with the grain binder and the remainder largely cut with the corn binder.

In areas 181, 174B and 175 of South Dakota, about one-half of the corn acreage was cut with the corn binder and the remainder largely husked from standing stalks. In other areas of the State, husking from standing stalks was the most common method.

In northwestern Nebraska, practically all of the corn harvest was from standing stalks.

In eastern Montana, harvest of corn with the corn binder was the most common method. The limited acreage grown in other areas of the State was cut with the grain binder, cut with the corn sled, or harvested with livestock.

In eastern South Dakota and southwestern Minnesota, from 10 to 30 percent of the corn acreage was harvested with the corn picker.

Corn husked from standing stalks was usually with an outfit consisting of 1-man, 2-horse team and wagon. For a yield of 20 bushels per acre, this outfit husked and stored corn at the rate of 50 bushels per 10-hour day.

Corn cut with the corn binder was either fed unhusked or put in the silo. Corn binders were all 1-row machines and usually operated with 1 man and a 3-horse team. The usual acreage cut per 10-hour day was 6 to 8 acres. The bundle corn was shocked at the rate of 5 or 6 acres per 10-hour day. Stacking of bundle corn with the usual outfit consisting of 2 men and wagon drawn with a 2-horse team was at the rate of 7 or 8 tons per 10-hour day.

Very little of the corn on surveyed farms was ensiled except in northeastern South Dakota and southwestern Minnesota. The rates of work in filling silos are not given, since reports of silo filling on surveyed farms were not in sufficient numbers to determine typical labor crews, power units and size of ensilage cutters.

Corn pickers were all 1-row machines. The usual crew consisted of 2 men, 1 to operate the tractor and picker and 1 man and team to haul and crib the corn. With this outfit 8 to 10 acres of corn were harvested and stored per 10-hour day. Where wagon hitches were not used, or if the distance to the crib was unusually long, an extra man and team were used in hauling and cribbing the corn.

NORMAL HARVEST PERIODS FOR SMALL GRAINS, FLAX AND CORN

The harvesting dates as shown in figure 17 represent the period when harvest is general and do not take into consideration variations in dates due to variations in seasons. Harvest with the combine and header was about 5 to 10 days later than when the binder was used. Spring wheat harvest was about 5 to 20 days later than winter wheat harvest. Spring wheat harvest with the combine in southern South Dakota was 10 to 15 days earlier than in northern North Dakota for areas of about the same longitude.

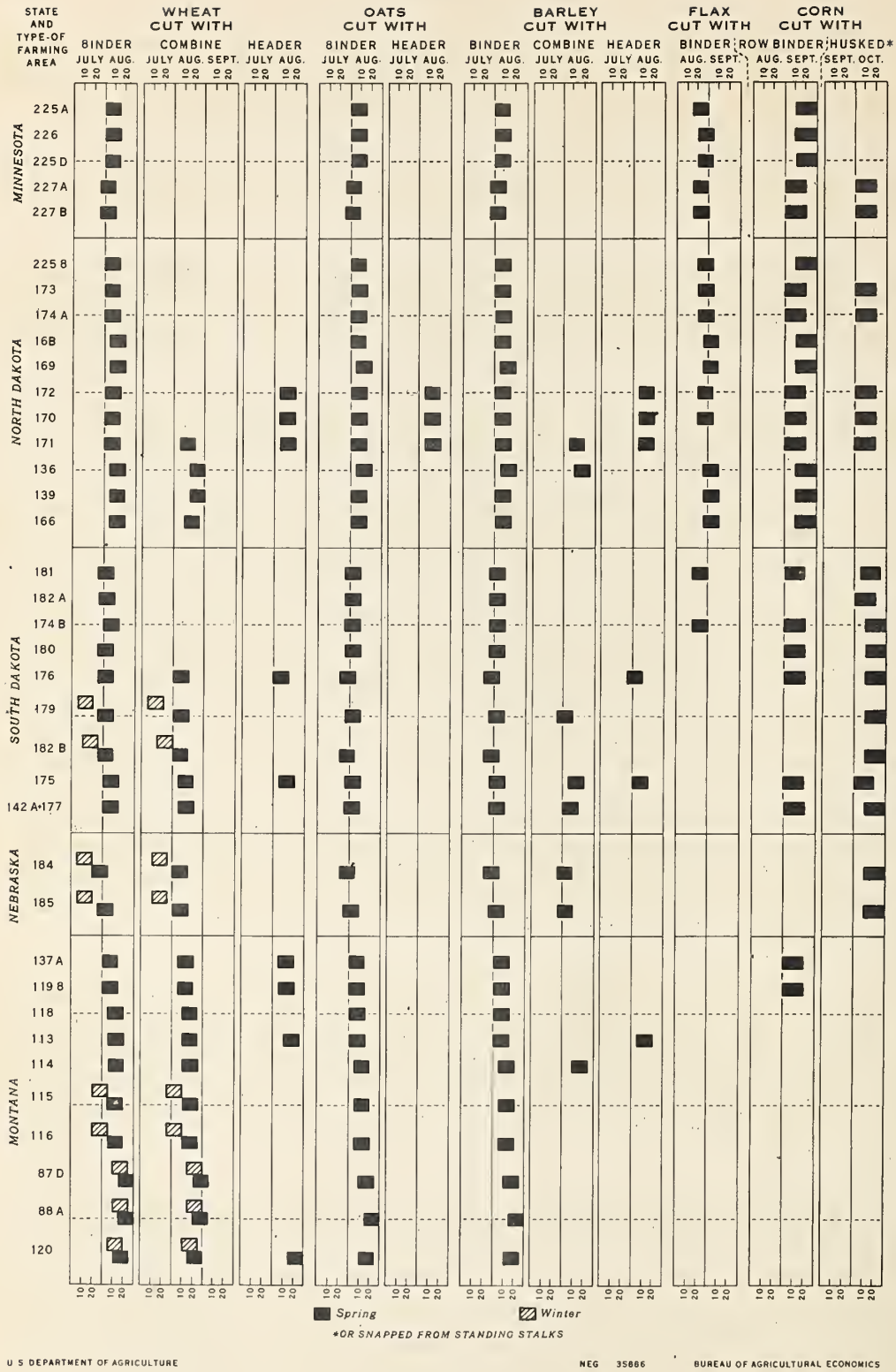

Figure 17. - Normal period for harvesting small grains, flax, and corn by type-of-farming areas, Northern Great Plains

MAKING HAY

Prairie hay, small grains, chiefly oats and barley cut for hay, and alfalfa make up the principal hay crops on surveyed farms in the Northern Great Plains. Prairie hay was not produced on surveyed farms in Montana except in the eastern and northwestern parts of the State and in these areas to only a limited extent. It was produced in practically all other areas; its greatest production being in central North Dakota and South Dakota. The greatest use of small grains for hay was in Montana, western North Dakota, northwestern Nebraska and southwestern Minnesota. Alfalfa was produced in greatest abundance in west-central Montana, northwestern Nebraska, eastern North Dakota, eastern South Dakota, and in northwestern Minnesota. For the region as a whole about 50 percent of the hay acreage was represented by prairie hay, 25 percent by grain hay, and 17 percent by alfalfa hay (table 21).

Common Sizes of Hay Harvesting Implements, Motive Power Units and Rates of Work

The common kinds and sizes of hay harvesting implements and the motive power used to draw them are shown in table 22. Seven- and 8-foot binders drawn with 4 horses, 12-foot headers drawn with 4 horses or a 15-drawbar horsepower high-wheel tractor, 5- and 6-foot mowers drawn with 2 horses and 10- and 12-foot sulky and sweep rakes drawn with 2 horses were the most common hay harvest implements.

The mowing machine was used to cut all prairie hay and alfalfa and most of the grain hay and sweet clover. From 3 to 7 percent of the sweet clover acreage was cut with the binder in eastern North Dakota. In other areas of the region it was all cut with the mower. Where sweet clover was cut with the binder it was a common practice to tie in loose bundles and cure in long shocks.

In northwestern North Dakota and northern Montana, from 15 to 45 percent of the grain hay was cut with the binder and in area 113 of Montana about 25 percent was cut with the header. In other areas practically all grain hay was cut with the mower. The rates of work in cutting and raking hay are shown in table 23.

Storage of Hay

Farmers in most areas put as much alfalfa hay in the barn as space would permit, the remainder being stacked. Because of the tendency of sweet clover to heat when put in the barn, it was usually stacked. Prairie hay and grain hay were usually stacked.

Hay stored in barns was hauled in wagons drawn with 2-horse teams. A number of different crews were used. With 1 wagon and a 2-horse team, crews of 1, 2, or 3 men were used but a 2-man crew was the most common. Where 2 wagons and two 2-horse teams were used, the most common labor crew consisted of 3 or 4 men.

Table 21. - Farms reporting hay and proportion of hay acreage represented by different kinds, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms reporting hay	Acreage of hay represented	Proportion of acreage in: Prairie hay	Grain hay	Alfalfa hay	Sweet clover hay	Millet	Timothy hay	Sudan
	Number	Acres	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Minnesota									
225A	36	1,494	48.5	11.6	11.6	19.6	5.2	3.0	.5
226	15	984	62.0	3.9	12.7	12.6	-	8.8	-
225D	13	752	31.9	12.8	40.3	6.2	8.8	-	-
227A	16	463	38.7	35.4	17.7	-	3.9	-	4.3
227B	20	419	14.8	40.6	36.3	1.2	7.1	-	-
North Dakota									
225B	11	935	56.7	4.3	1.6	28.8	8.6	-	-
173	20	780	64.8	11.5	14.7	-	9.0	-	-
174A	29	1,347	36.6	6.9	41.1	5.0	-	10.4	-
168	39	2,822	57.9	21.7	1.1	15.1	-	4.2	-
169	22	966	83.0	-	-	8.8	8.2	-	-
172	39	2,637	77.1	16.0	3.7	1.5	1.7	-	-
170	24	1,045	15.4	39.9	22.4	5.7	15.1	-	1.5
171	25	1,246	12.4	83.3	.3	-	4.0	-	-
136	50	3,139	29.8	57.9	.2	5.4	6.7	-	-
139	9	248	12.1	59.7	-	-	24.2	-	4.0
166	29	1,254	25.0	66.4	.2	4.6	2.2	-	1.6
South Dakota									
181	21	744	6.6	22.7	46.4	10.7	7.4	-	6.2
182A	11	259	53.3	12.4	34.3	-	-	-	-
174B	23	1,024	58.9	17.4	22.2	1.0	-	-	.5
180	14	1,155	91.7	-	7.0	-	-	-	1.3
176	23	3,380	63.5	25.6	8.7	-	.7	-	1.5
179	18	10,052	96.6	-	3.3	-	-	-	.1
182B	2	36	-	-	100.0	-	-	-	-
175	16	1,299	38.1	3.5	58.4	-	-	-	-
142A & 177	23	1,679	28.0	30.2	35.0	5.6	1.2	-	-
Nebraska									
184	26	1,250	15.2	30.0	42.7	1.2	7.4	-	3.5
185	8	531	16.9	57.8	18.7	-	1.9	-	4.7
Montana									
137A	21	829	6.6	26.9	.5	66.0	-	-	-
119B	11	441	-	76.2	13.6	6.8	3.4	-	-
118	24	1,104	-	98.9	1.1	-	-	-	-
113	29	1,298	-	97.0	-	1.5	1.5	-	-
114	20	435	-	36.1	57.5	6.4	-	-	-
115	12	676	-	34.2	63.6	2.2	-	-	-
116	20	800	17.5	15.0	47.5	17.5	-	2.5	-
87D	13	869	14.4	4.9	80.7	-	-	-	-
88A	25	895	4.5	1.9	91.2	.7	-	1.7	-
120	13	718	-	38.8	53.5	7.7	-	-	-
Total or average	770	50,005	49.4	24.8	16.6	5.4	2.4	.9	.5

Table 22.-Common sizes of hay harvesting implements and motive power used, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Farms surveyed	Farmers reporting the use of: 7-foot binders drawn with 4 horses	8-foot binders drawn with 4 horses	12-foot headers drawn with 4 horses	12-foot headers drawn with 15 d.b.h.p. high-wheel tractor 1/	5-foot mowers drawn with 2 horses	6-foot mowers drawn with 2 horses	10-foot sulky rakes drawn with 2 horses	12-foot sulky rakes drawn with 2 horses	10 or 12-foot sweep rakes drawn with 2 horses
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota										
225A	43	1	2	-	-	30	4	30	4	19
226	16	-	-	-	-	14	2	12	-	10
225D	20	1	1	-	-	11	4	14	-	8
227A	25	-	-	-	-	13	3	11	5	3
227B	29	-	2	-	-	15	3	16	-	8
North Dakota										
225B	12	2	-	-	-	10	2	10	1	5
173	34	-	-	-	-	19	-	20	-	9
174A	52	-	-	-	-	32	1	30	3	21
168	40	1	3	-	-	38	-	37	-	10
169	36	-	1	-	-	22	-	21	-	7
172	55	-	2	-	-	34	7	35	4	10
170	37	-	-	-	-	24	2	25	1	4
171	48	-	1	-	-	24	1	25	-	3
136	70	1	13	-	-	46	-	44	1	7
139	19	1	3	-	-	7	-	7	-	2
166	40	-	2	-	-	28	-	25	5	5
South Dakota										
181	32	-	1	-	-	16	4	18	2	4
182A	27	-	-	-	-	12	1	11	1	1
174B	31	-	1	-	-	19	7	12	13	11
180	30	-	-	-	-	17	3	18	4	10
176	41	-	-	-	-	3	13	7	15	4
179	19	-	-	-	-	1	11	4	5	15
182B	26	-	1	-	-	3	6	2	6	2
175	29	-	-	-	-	24	-	15	4	5
142A & 177	27	-	-	-	-	8	10	18	5	10
Nebraska										
184	47	1	1	-	-	14	18	24	10	3
185	22	-	1	-	-	2	7	5	4	9
Montana										
137A	34	1	1	-	-	21	-	16	2	6
119B	23	-	4	-	-	5	2	7	-	-
118	29	1	5	-	-	15	2	16	4	-
113	50	-	2	4	4	8	-	9	-	-
114	46	-	1	-	-	12	4	14	2	4
115	26	-	-	-	-	11	2	15	2	2
116	41	-	-	-	-	18	-	17	-	4
87D	22	-	-	-	-	14	-	13	2	10
88A	42	-	-	-	-	24	-	20	-	18
120	20	-	1	-	-	9	4	14	-	4
Total	1,240	10	49	4	4	623	123	637	105	253

1/ Drawbar horsepower high-wheel tractor.

Table 23. - Estimates of rates of work in cutting and raking hay with implements of different kinds and sizes, Northern Great Plains

Kind and size of implement	Power unit	Usual acreage per 10-hour day
		Acres
7-foot binder	4 horses	14 to 16
8-foot binder	do	15 to 18
12-foot header	do	20 to 24
do	10 d.b. h.p. tractor 1/	28 to 30
5-foot mower	2 horses	8 to 10
6-foot mower	do	10 to 14
10-foot sulky rake	do	18 to 20
12-foot sulky rake	do	20 to 24

1/ Drawbar horsepower high-wheel tractor.

Hay stored in stacks was either hauled to the stack in wagons or conveyed to the stack with the sweep rake. Grain hay was practically all hauled to the stack in wagons and stacked by hand methods. On the other hand a number of different ways were used in stacking alfalfa and prairie hay. Sometimes it was hauled with wagons and elevated to the stack with an overshot stacker, or it might be conveyed to the stack with a sweep rake and stacked by hand. However most of the alfalfa and prairie hay was either hauled to the stack in wagons and stacked by hand methods or conveyed to the stack with the sweep rake and elevated to the stack with the overshot stacker.

Where sweep rakes and overshot stackers were used, the usual crew consisted of 3 men, 1 man and a 2-horse team on the sweep rake, 1 man on the stack and 1 man and a stacker team to elevate the hay to the stack. An outfit of this size stacked alfalfa and sweet clover yielding about 1 ton per acre, at the rate of 12 to 14 tons per 10-hour day. Prairie hay yielding about .5 tons per acre was stacked with sweep rake and overshot stacker at the rate of about 10 to 12 tons per 10-hour day.

Where hay was hauled to the stack in wagons and stacked by hand methods, a wagon drawn with a 2-horse team and a crew of 2 men was the most common. Where 1 wagon was used, hay yielding from .5 to .75 tons per acre was hauled and stacked at the rate of 6 to 8 tons per 10-hour day.

The hours of labor and power used per 100 acres in making different kinds of hay are shown in appendix table 58.

APPLICATION OF BASIC DATA TO INDIVIDUAL FARMS

The data included in this report are not intended to serve as a basis for budgeting all of the productive resources of these cash grain farms. They should, however, serve a useful purpose in setting up standards for field work. Successful planning of a cropping system involves a knowledge of the proper kinds and sizes of farm implements and the time necessary to perform the desired operations on a given acreage. This principle is illustrated by the following example of standards for field work in preparing seedbed, planting, and harvesting spring wheat on a typical wheat farm (table 24). This illustration applies to area 137A of Montana and is based on spring wheat alternated with summer fallow and harvested with a combine. The method applies as well to spring wheat or other field crops grown after small grains or row crops and harvested by other methods.

Table 24. - Standards for field work in preparing seedbed, seeding, harvesting and marketing 100 acres of spring wheat where alternated with summer fallow

Kind and amount of work	Size of crew, power, and size and type of implement used	Rate of work per 10-hour day	Total				Usual period for field work
			Man labor	Horse work	Tractor work	Truck work	
			Hours	Hours	Hours	Hours	
Plowing (100 acres)	1-man and 15 d.b. h.p. tractor, 1/ 3-bottom 14-inch moldboard plow	12 acres	83.3	-	83.3	-	June 1 to July 1
Disking (100 acres)	1-man and 15 d.b. h.p. tractor, 10-foot tandem disk harrow	30 acres	33.3	-	33.3	-	July
Harrowing (200 acres)	1-man and 4-horses 20-foot spike-tooth harrow	38 acres	52.6	210.4	-	-	July and April
Drilling (100 acres)	1-man and 4-horses 10-foot disk drill	20 acres	50.0	200.0	-	-	April 10 to April 25
Harvesting (100 acres)	2-men and 15 d.b. h.p. tractor, 12-foot combine	28 acres	71.4	-	35.7	-	Aug. 5 to Aug. 15
Hauling wheat to granary (125 bushels)	1-man and 1½ ton motor truck	225 bushels	5.6	-	-	5.6	Aug. 5 to Aug. 15
Hauling wheat to elevator (675 bushels, 10 miles)	1-man and 1½ ton motor truck	225 bushels	30.0	-	-	30.0	Aug. 5 to Aug. 15
Miscellaneous work (clean and treat seed, haul seed and fuel)			18.0	-	-	6.0	
Total			344.2	410.4	152.3	41.6	

1/ Drawbar horsepower high-wheel tractor.

APPENDIX

Tables 25 to 58 included are intended for the use of those who require detailed information other than that given in the tables and charts that precede them.

Tables showing the labor and power in preparing seedbed and seeding field crops and in harvesting crops by different methods are based on the methods of production and harvesting which were discussed in some detail in the main body of the text. A wide range in methods employed on different farms as well as a considerable range in different areas are shown. The labor and power requirements are influenced by soil and topography, size and shape of fields, size and type of implements, and size and type of power units. The hours of labor and power for some crops, especially oats, barley and flax in certain areas, are represented by only a few observations. For this reason, differences in hours of labor and power used on certain crops as between these type-of-farming areas may not be significant. However, averages for the region probably represent closely the normal requirements.

In general, the hours of man labor for seedbed preparation and seeding were highest where the crop in question was alternated with summer fallow, somewhat lower where seeded after small grains, and lowest where seeded after a row crop. The hours of man labor for harvesting and threshing were highest where small grains were harvested with the binder, somewhat lower where harvest was with the header, and considerably lower where harvest was with the combine.

Table 25.-Number of farm records secured in each state and county, by type-of-farming areas, Northern Great Plains

Type-of-farming area	County and State	Farm Records Number	Type-of-farming area	County and State	Farm Records Number	Type-of-farming area	County and State	Farm Records Number
225A	Marshall, Minn.	13	171	Hettinger, N. D.	36	142A&177	Pennington, S. D.	22
	Grand Forks, N. D.	8		Stark, N. D.	10		Haakon, S. D.	5
	Walsh, N. D.	16		Grant, N. D.	2			
	Traill, N. D.	6				184	Dawes, Neb.	13
			136	Mountrail, N. D.	21		Sheridan, Neb.	12
226	Red Lake, Minn.	3		Williams, N. D.	27		Bennett, S. D.	10
	Marshall, Minn.	6		Daniels, Mont.	22		Todd, S. D.	12
	Pennington, Minn.	7						
			139	McKenzie, N. D.	19	185	Box Butte, Neb.	22
225D	Polk, Minn.	20						
			166	Bottineau, N. D.	28	137A	Richland, Mont.	34
227A	Swift, Minn.	19		Renville, N. D.	12			
	Stevens, Minn.	6				119B	McCone, Mont.	23
			181	Codington, S. D.	14			
227B	Redwood, Minn.	6		Hamlin, S. D.	5	118	Phillips, Mont.	29
	Lac qui Parle, Minn.	5		Clark, S. D.	10			
	Yellow Medicine, Minn.	18		Deuel, S. D.	3	113	Hill, Mont.	21
							Toole, Mont.	23
225B	Pembina, N. D.	12	182A	Hanson, S. D.	26		Chouteau, Mont.	3
				Miner, S. D.	1		Liberty, Mont.	3
173	Griggs, N. D.	34						
			174B	Brown, S. D.	24	114	Cascade, Mont.	4
174A	Sargent, N. D.	17		Spink, S. D.	7		Pondera, Mont.	32
	Case, N. D.	10					Teton, Mont.	10
	Marshall, S. D.	17	180	Jerauld, S. D.	27			
	Roberts, S. D.	8		Aurora, S. D.	3	115	Cascade, Mont.	26
168	Cavalier, N. D.	39	176	Potter, S. D.	15	116	Judith Basin, Mont.	20
	Towner, N. D.	1		Sully, S. D.	6		Fergus, Mont.	21
				Hand, S. D.	8			
169	Pierce, N. D.	34		Hyde, S. D.	12	87D	Broadwater, Mont.	22
	Benson, N. D.	2						
			179	Lyman, S. D.	19	88A	Gallatin, Mont.	42
172	Kidder, N. D.	37						
	McIntosh, N. D.	7	182B	Tripp, S. D.	26	120	Stillwater, Mont.	14
	Campbell, S. D.	11					Yellowstone, Mont.	6
			175	Dewey, S. D.	12			
170	Morton, N. D.	37		Corson, S. D.	15			
				Sioux, N. D.	2			

Table 26.-Kinds and numbers of livestock per farm on surveyed farms, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Pasture acreage per farm	Average number of livestock per farm																	
			Cattle						Sheep		Hogs		Poultry		Turkeys		Horses			
			Milk cows	Beef cows	Calves	Year-lings	2-year olds	Other	Ewes	Lambs	Sows	Pigs	Laying hens	Chicks	Hens	Poults	Work	Stock	Colts
	Number	Acres	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																			
225A	43	45	7.2	.1	6.5	3.1	1.2	.6	4.6	3.7	2.2	14.5	53	87	4.9	49.4	6.6	-	.4
226	16	108	9.2	.3	8.6	2.1	2.2	.3	9.6	13.8	1.1	4.8	73	87	10.2	84.6	4.4	.6	.1
225D	20	48	9.3	.6	8.4	4.9	1.7	.9	6.2	5.2	2.6	17.4	125	150	4.7	56.8	7.2	-	.4
227A	25	37	8.8	.4	8.3	3.6	1.1	.4	3.3	2.2	7.0	46.0	78	230	1.5	4.6	4.9	.2	.7
227B	29	24	9.2	.3	8.3	3.6	2.0	.6	.6	.2	8.0	51.3	112	215	.4	15.3	6.0	.2	.8
North Dakota																			
225B	12	132	8.9	.1	8.2	4.3	3.0	.5	24.1	20.4	.7	3.9	81	139	7.5	60.7	5.2	.2	.2
173	34	143	9.7	2.0	10.5	5.0	4.0	.6	20.5	16.3	2.1	13.5	81	115	5.4	28.9	6.6	.1	.7
174A	52	162	9.4	5.2	11.1	6.3	2.4	1.8	21.2	19.2	7.4	43.4	78	165	3.3	19.4	8.5	.4	.8
168	40	105	8.0	.8	7.2	4.4	2.1	.4	13.9	12.9	2.0	13.4	54	91	1.8	19.1	6.7	.2	.5
169	36	138	8.6	.3	7.6	4.0	4.4	.5	1.2	.2	2.6	14.2	74	149	2.0	9.7	19.2	-	.9
172	55	282	13.6	2.1	13.3	6.8	5.4	1.3	14.3	10.0	3.4	18.6	71	122	3.3	15.3	6.9	.4	1.1
170	37	294	11.4	2.2	9.9	4.5	4.2	.6	5.8	5.6	2.7	21.1	75	155	1.3	4.8	7.6	.8	1.1
171	48	349	11.3	5.2	14.9	8.3	4.5	.8	6.1	4.1	5.6	30.7	73	129	1.1	6.5	6.4	.4	1.0
136	70	232	7.1	3.1	8.5	4.6	2.5	.9	3.7	2.9	1.5	7.6	49	75	2.2	15.4	5.2	.2	.3
139	19	253	4.5	8.4	9.4	7.5	5.5	.6	1.6	1.4	.7	2.9	48	70	.9	.6	4.6	.8	.8
166	40	100	7.9	1.2	8.2	3.4	1.9	.4	24.2	21.2	1.1	3.9	51	91	3.3	26.0	5.0	.3	.4
South Dakota																			
181	32	77	9.4	1.5	9.6	3.7	3.8	.4	19.3	25.8	5.4	33.8	106	202	2.1	11.7	6.1	.1	1.0
178A	27	75	7.0	1.8	10.2	4.7	2.4	.4	5.2	4.3	5.9	28.3	124	218	1.2	8.9	5.8	-	.4
174B	31	165	8.2	6.6	10.6	5.4	2.7	1.0	5.5	5.7	12.7	64.6	86	147	3.2	14.8	6.5	.5	.8
180	30	167	8.9	5.9	11.4	2.9	2.1	.2	1.6	.4	8.4	52.7	133	279	.7	2.8	5.2	.5	.6
176	41	631	11.0	20.9	23.9	13.0	6.2	.7	31.1	18.3	9.2	58.8	86	170	3.9	22.2	5.3	1.5	1.7
179	19	1213	6.9	27.0	63.3	21.2	19.3	1.3	.2	-	6.8	39.3	85	182	2.2	16.5	5.0	1.3	1.0
182B	26	107	6.2	4.6	8.6	4.1	.4	1.7	5.3	-	4.0	32.3	80	208	5.0	91.7	4.0	.2	.2
175	29	414	12.4	4.5	13.1	9.2	6.7	1.0	13.4	9.0	6.6	40.6	61	114	2.3	14.8	5.9	.7	1.2
142A&177	27	384	9.6	7.8	13.2	6.1	2.6	1.5	10.6	6.7	6.1	42.8	93	127	2.7	9.5	4.0	1.2	.5
Nebraska																			
184	47	289	7.3	9.4	12.9	6.2	2.1	.9	12.7	6.4	6.0	38.3	77	143	1.9	6.6	5.1	.4	.7
185	22	91	5.5	3.5	6.1	4.5	1.6	.2	-	-	10.7	48.5	112	172	.8	1.6	6.8	.2	1.3
Montana																			
137A	34	236	4.9	5.3	9.1	2.5	2.4	.3	13.6	9.6	1.6	10.8	65	99	1.4	10.5	6.5	.6	.4
119B	23	388	4.6	5.8	9.1	3.7	2.1	.7	11.3	4.8	1.0	5.7	59	88	.3	.8	4.6	.7	.4
118	29	455	5.8	12.8	14.3	4.2	4.2	1.3	4.8	3.9	.8	3.6	48	54	.6	1.7	5.6	.7	1.0
113	50	560	4.4	4.6	7.8	4.2	2.7	.6	36.5	18.4	1.2	6.3	56	88	1.3	4.0	2.9	.8	.4
114	46	153	3.4	3.4	6.2	2.0	2.6	1.2	3.0	2.3	1.6	12.6	73	111	1.0	8.8	2.8	.2	.2
115	26	156	2.8	5.4	6.0	2.2	1.5	.2	-	-	1.6	13.9	82	122	1.3	14.4	2.7	-	.2
116	41	121	3.9	2.6	5.8	1.0	1.4	.6	12.4	10.0	.9	5.3	55	82	.7	9.0	3.0	.4	.2
87D	22	376	3.8	18.0	16.5	7.8	4.7	.4	4.5	3.7	2.1	14.4	82	241	1.0	.8	7.4	1.0	.7
88A	42	148	5.0	4.9	8.7	2.0	1.8	.3	8.5	5.3	1.5	10.5	108	137	.2	4.2	6.4	.6	.4
120	20	1414	5.7	12.1	15.8	8.3	5.3	.4	41.5	30.8	.9	8.6	84	128	2.0	3.4	4.4	.8	.5
TOTAL OR AVERAGE	1240	258	7.8	5.1	10.5	5.1	3.2	.8	11.4	8.4	3.9	23.5	76	135	2.3	16.4	5.7	.4	.7

Table 27.-Farms with tractors: Number and size of farms and distribution of crop acreage on surveyed farms, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Total acreage per farm	Pasture acreage per farm	Crop acreage per farm												
				Winter Wheat	Spring Wheat	Oats	Barley	Flax	Rye	Corn	Alfalfa and sweet Clover	Summer fallow	Idle (not fallowed)	Other	Total
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Minnesota															
225A	29	384	39	-	110	44	53	28	2	11	25	24	2	31	330
226	4	460	145	-	71	78	14	40	1	40	42	12	-	10	308
225D	15	443	51	-	117	47	55	27	3	15	43	30	-	36	373
227A	16	337	46	-	59	66	25	5	6	97	10	1	-	7	276
227B	13	302	27	-	60	43	18	17	5	88	11	4	1	4	251
North Dakota															
225B	9	684	160	-	158	69	31	35	5	7	79	89	2	31	506
173	18	609	151	-	215	46	49	6	7	28	20	36	13	14	434
174A	35	694	204	-	185	52	60	14	10	79	25	20	-	-	445
168	26	762	119	-	281	72	92	10	-	3	50	102	1	12	623
169	24	764	159	-	400	52	24	8	11	7	17	50	6	4	579
172	28	731	295	-	220	23	51	-	42	35	3	13	8	12	415
170	25	583	276	-	170	35	23	6	4	34	9	-	1	10	292
171	35	860	345	-	334	25	55	-	33	39	-	2	4	5	497
136	51	773	249	-	325	39	18	20	9	15	18	42	19	4	509
139	16	792	261	-	353	24	18	3	-	14	3	62	17	11	505
166	33	674	98	-	253	42	37	13	7	28	20	63	79	10	552
South Dakota															
181	16	497	95	-	101	59	52	38	18	62	30	9	6	16	391
182A	7	319	86	-	54	30	19	-	12	90	15	-	-	3	223
174B	20	676	216	5	161	45	104	6	7	97	13	1	4	2	445
180	16	594	234	-	102	36	35	-	27	134	8	3	2	3	350
176	34	1362	702	4	247	51	93	-	69	135	14	16	8	12	649
179	15	2086	1476	200	164	31	88	2	3	76	20	-	6	8	598
182B	14	611	102	80	201	14	82	-	8	83	6	-	-	22	496
175	21	1024	431	-	361	31	47	2	11	59	30	6	17	7	571
142A & 177	24	918	422	64	180	19	25	3	4	112	42	1	14	9	473
Nebraska															
184	33	718	295	68	99	27	46	-	5	103	20	11	14	14	407
185	20	817	93	180	113	58	81	-	6	137	11	43	10	73	712
Montana															
137A	18	648	228	11	236	22	11	10	-	39	22	23	20	2	396
119B	17	1155	416	91	409	22	-	60	2	15	24	83	9	1	716
118	22	912	486	-	232	40	5	6	1	10	1	55	53	5	408
113	48	1299	529	30	385	21	16	4	5	5	2	195	76	1	740
114	44	727	150	3	281	9	8	3	-	-	8	209	5	31	557
115	26	1274	156	440	143	11	8	-	-	1	19	454	8	10	1094
116	36	632	105	201	148	5	1	-	-	3	14	124	12	3	511
87D	8	958	395	140	65	17	6	-	-	-	39	231	27	-	525
88A	24	667	166	71	146	10	1	-	-	-	22	226	-	2	478
120	13	2095	1408	322	70	9	3	-	-	14	28	206	10	-	662
Total or Average	853	825	287	48	220	33	37	9	10	43	17	74	15	11	517

Table 28.-Farms without tractors: Number and size of farms and distribution of crop acreage on surveyed farms, by type-of-farming areas, Northern Great Plains, 1933

State and type-of farming area	Farms	Total acreage per farm	Pasture acreage per farm	Crop acreage per farm: Winter Wheat	Spring Wheat	Oats	Barley	Flax	Rye	Corn	Alfalfa and sweet Clover	Summer fallow	Idle (not fallowed)	Other	Total
	Number	acres	acres	acres	acres	acres	acres	acres	acres	acres	acres	acres	acres	acres	acres
Minnesota															
225A	14	324	57	-	91	33	36	11	3	10	24	16	6	25	255
226	12	242	93	-	19	35	5	6	-	9	19	1	2	14	110
225D	5	256	40	-	70	29	33	5	-	10	25	16	-	17	205
227A	9	219	22	-	30	53	23	1	-	55	19	-	-	8	189
227B	16	195	22	-	33	36	13	7	1	57	9	1	1	3	161
North Dakota															
225B	3	317	48	-	112	24	22	13	-	20	49	6	-	14	260
173	16	485	134	-	128	47	48	7	6	24	22	39	-	10	331
174A	17	281	36	-	113	27	28	8	-	32	13	1	2	7	231
168	14	411	80	-	145	32	62	-	1	1	11	48	-	2	302
169	12	448	94	-	258	36	13	-	3	4	1	15	10	2	342
172	27	565	268	-	134	17	38	3	26	40	2	1	8	7	276
170	12	617	330	-	154	22	25	3	5	32	12	4	3	2	262
171	13	640	359	-	152	12	21	2	23	26	-	-	11	14	261
136	19	428	219	-	128	25	10	8	2	9	6	4	-	3	195
139	3	440	212	-	124	16	-	3	-	7	-	27	25	5	207
166	7	372	110	-	107	21	27	4	5	14	5	51	9	6	249
South Dakota															
181	16	303	59	-	56	44	38	10	11	42	19	-	6	6	232
182A	20	285	71	-	40	34	28	-	10	80	8	-	-	3	203
174B	11	362	72	-	110	27	43	-	4	72	6	-	4	1	267
180	14	295	90	-	47	25	19	-	11	85	7	-	2	2	198
176	7	551	288	-	67	36	29	-	43	61	15	-	2	-	253
179	4	410	228	14	59	16	12	-	7	49	19	-	-	3	179
182B	12	323	114	13	48	11	37	-	13	64	2	-	-	10	198
175	8	683	372	-	115	28	19	-	-	36	36	-	13	9	256
142A & 177	3	354	99	-	98	27	27	-	-	50	17	-	-	7	226
Nebraska															
184	14	511	277	11	51	16	22	-	2	94	13	2	-	9	220
185	2	280	65	50	17	10	28	-	-	65	8	-	-	24	202
Montana															
137A	16	585	245	-	127	22	12	-	-	55	19	25	19	-	279
119B	6	703	306	45	182	8	-	11	-	7	7	16	16	5	297
118	7	621	354	-	102	21	3	-	2	13	16	25	68	2	252
113	2	1590	1293	-	224	13	-	-	-	-	-	5	-	-	242
114	2	440	209	-	128	25	10	-	-	-	24	37	-	-	224
116	5	508	256	102	42	-	4	10	-	4	19	57	-	-	238
87D	14	578	365	31	56	7	2	-	-	-	32	54	13	-	195
88A	18	399	123	42	69	7	1	-	-	-	21	114	1	5	260
120	7	1640	1425	61	33	8	6	-	-	4	23	41	4	8	188
Total or Average	387	452	194	8	96	25	23	3	6	35	14	17	6	6	239

Table 29.- Labor and power used per 100 acres in preparing seedbed and seeding spring wheat where grown after small grains and flax, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of spring wheat	Proportion of spring wheat acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota:															
225A	38	2823	63.3	188.7	680.9	47.3	47.7	178.0	2.1	24.3	100.4	.7	260.7	959.3	50.1
226	9	440	86.4	219.3	893.4	49.1	53.6	210.4	-	25.0	111.6	-	297.9	1215.4	49.1
225D	17	1428	69.1	188.7	729.5	48.9	41.5	146.2	5.3	18.1	70.8	4.2	248.3	946.5	58.4
227A	14	572	43.7	162.8	267.3	104.7	54.2	211.2	1.4	15.0	61.9	.5	232.0	540.4	106.6
227B	10	271	20.7	178.2	525.1	68.6	50.6	202.2	-	17.0	71.2	-	245.8	798.5	68.6
North Dakota:															
225E	12	1480	84.2	150.7	300.0	79.0	39.4	119.2	8.9	11.1	37.2	2.2	201.2	456.4	90.1
173	28	3813	64.4	146.5	475.1	63.2	65.0	176.5	3.4	.2	.8	-	211.7	652.4	66.6
174A	45	4828	62.1	141.0	466.0	52.9	47.4	189.4	2.2	9.0	42.8	.3	197.4	698.2	55.4
168	35	5461	58.5	123.2	387.0	49.3	40.6	144.6	4.4	13.5	54.1	1.9	177.3	585.7	55.6
169	36	11170	88.0	159.4	616.1	61.6	70.0	159.5	15.3	6.9	33.5	-	236.3	809.1	76.9
172	48	7819	80.2	97.6	356.3	26.9	58.3	165.1	6.6	5.0	19.2	-	160.9	540.6	33.5
170	37	4792	79.1	113.2	451.2	29.0	70.0	199.0	.5	8.3	31.5	-	191.5	681.7	29.5
171	46	12505	91.5	79.2	164.3	42.9	55.9	119.0	12.5	1.6	6.1	-	136.7	289.4	55.4
136	67	16441	86.6	70.3	118.1	46.9	51.3	105.9	15.2	4.6	16.3	.5	126.1	240.3	62.6
139	16	4526	75.1	84.6	62.6	70.2	48.1	86.6	16.6	3.8	17.4	-	136.5	166.6	86.8
166	37	6270	69.1	93.2	173.1	61.1	39.0	97.7	16.2	9.2	35.6	2.1	141.4	306.4	79.4
South Dakota:															
181	22	2198	87.5	135.5	522.6	37.3	38.5	144.1	6.6	7.9	45.8	-	181.9	712.5	43.9
174B	24	2507	56.6	116.8	458.4	36.9	37.3	112.2	13.2	5.9	21.5	1.4	160.0	592.1	51.5
180	3	170	7.4	-	-	-	66.5	115.3	36.5	19.4	58.8	4.7	85.9	174.1	41.2
176	26	4811	55.7	20.1	8.2	18.0	31.0	15.3	26.2	5.9	10.5	3.4	57.0	34.0	47.6
179	7	1423	52.7	23.4	-	23.4	23.1	7.0	20.3	5.3	1.1	5.1	51.8	8.1	48.8
182B	6	1475	43.5	-	-	-	31.0	73.3	12.5	-	-	-	31.0	73.3	12.5
175	25	7091	83.3	50.1	128.9	19.8	49.4	81.2	22.4	1.9	4.8	.7	101.4	214.9	42.9
142AA177	15	2174	46.3	36.0	12.2	33.6	45.1	39.8	27.5	1.7	6.6	-	82.8	58.6	61.1
Nebraska:															
184	7	1113	27.9	37.6	71.7	25.4	37.2	26.2	31.4	1.0	4.0	-	75.8	101.9	56.8
185	3	167	7.3	48.5	43.1	37.7	41.3	33.5	32.9	-	-	-	89.8	76.6	70.6
Montana:															
137A	30	3949	62.9	94.5	318.2	42.0	44.5	85.8	17.0	8.0	39.8	-	147.0	443.8	59.0
119B	20	6080	75.4	51.4	112.0	30.8	45.4	36.2	28.5	.3	1.3	-	97.1	149.5	59.3
118	25	3389	58.2	44.9	51.8	34.6	54.2	55.8	26.5	.8	4.6	-	99.9	112.2	61.1
113	41	10973	58.4	39.6	9.3	36.9	43.5	53.5	25.6	.2	-	.2	83.3	62.8	62.7
114 1/	2	66	.5	272.8	797.0	57.6	51.5	263.6	-	12.1	72.7	-	336.4	1133.3	57.6
2/	24	3202	25.4	35.8	22.4	31.5	33.0	11.6	24.3	.9	-	.9	69.7	34.0	56.7
115	11	1882	56.7	48.7	-	48.7	27.7	5.1	20.2	-	-	-	76.4	5.1	68.9
116 1/	1	10	.2	630.0	2080.0	-	80.0	280.0	-	-	-	-	710.0	2360.0	-
2/	24	3390	61.3	41.9	63.7	31.5	40.0	33.3	23.1	-	-	-	81.9	97.0	54.6
87D 1/	7	251	19.3	455.0	2227.9	35.5	80.9	232.7	-	31.1	124.3	-	567.0	2584.9	35.5
2/	2	130	10.0	113.8	270.8	46.2	36.9	76.9	12.3	-	-	-	150.7	347.7	58.5
88A	2	40	.8	300.0	960.0	85.0	72.5	220.0	-	10.0	-	10.0	382.5	1180.0	95.0
120	4	580	50.4	91.9	219.0	63.6	51.2	173.8	13.3	-	-	-	143.1	392.8	76.9
Total or average	826	141710	63.5	87.6	241.1	42.4	49.2	105.8	15.4	5.1	20.2	.6	141.9	367.1	58.4

1/ Irrigated - Irrigation included in seedbed preparation.

2/ Non-irrigated.

Table 30. - Labor and power used per 100 acres in preparing seedbed and seeding winter wheat where grown after small grains and flax, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of winter wheat	Proportion of winter wheat acreage	Seedbed preparation			Seeding			Cultivation after seeding		Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
South Dakota														
174B	2	90	100.0	-	-	-	47.8	246.7	-	-	-	47.8	246.7	-
176	2	120	100.0	-	-	-	26.7	-	26.7	-	-	26.7	-	26.7
179	15	3,052	100.0	3.7	-	3.7	24.5	-	24.5	-	-	28.2	-	28.2
182B	5	1,052	82.7	17.4	-	17.4	21.8	19.0	17.0	-	-	39.2	19.0	34.4
142A & 177	8	1,469	96.1	27.0	-	27.0	31.2	10.9	24.8	-	-	58.2	10.9	51.8
Nebraska														
184	13	1,893	84.6	48.8	-	48.8	33.3	36.8	23.7	-	-	82.1	36.8	72.5
185	8	2,408	64.9	28.6	77.7	14.7	39.2	63.1	24.0	-	-	67.8	140.8	38.7
Montana														
137A	1	200	100.0	-	-	-	39.0	-	25.0	-	-	39.0	-	25.0
119B	6	1,820	100.0	-	-	-	32.0	48.8	18.4	-	-	32.0	48.8	18.4
113	2	585	46.2	-	-	-	29.9	-	21.7	-	-	29.9	-	21.7
115	4	755	8.0	2.0	-	2.0	38.8	-	27.0	-	-	40.8	-	29.0
116	23	3,733	50.5	6.5	52.3	-	34.6	38.2	19.7	-	-	41.1	90.5	19.7
88A	2	247	10.1	149.4	92.3	126.3	51.8	29.2	23.9	5.3	21.0	206.5	142.5	150.2
120	7	1,325	32.6	-	-	-	52.4	40.9	30.0	-	-	52.4	40.9	36.0
Total or average	98	18,749	46.5	15.6	21.6	12.3	33.7	30.5	23.1	.1	.3	49.4	52.4	35.4

Table 33.-Labor and power used per 100 acres in preparing seedbed and seeding flax where grown after small grains and flax, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of flax	Proportion of flax acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	18	506	52.6	218.4	719.2	65.2	43.5	156.5	4.4	7.5	31.2	.8	269.4	906.9	70.4
226	10	227	100.0	218.9	533.9	105.7	48.9	191.2	-	22.9	88.1	--	290.7	813.2	105.7
225D	7	395	100.0	185.8	624.8	75.7	36.5	167.1	6.6	11.6	58.0	--	233.9	849.9	82.3
227A	3	56	68.3	191.1	362.5	116.1	46.4	100.0	21.4	8.9	-	8.9	246.4	462.5	146.4
227B	9	205	64.3	224.9	817.6	54.6	54.6	218.5	-	9.8	45.8	-	289.3	1081.9	54.6
North Dakota															
225B	4	140	40.0	335.7	1048.6	80.0	46.4	185.7	-	-	-		382.1	1234.3	80.0
173	7	197	88.7	174.1	762.4	34.0	44.2	160.4	4.1	-	-	-	218.3	922.8	38.1
174A	10	388	76.4	168.6	397.2	90.7	41.0	142.3	5.2	2.1	8.2	-	211.7	547.7	95.9
168	5	235	92.2	158.3	60.4	145.1	31.9	47.6	20.0	14.9	40.8	4.7	205.1	148.8	169.8
169	4	185	100.0	171.9	1021.1	17.8	56.2	183.8	-	-	-	-	228.1	1204.9	17.8
172	8	315	100.0	129.2	334.6	67.3	51.7	198.1	2.2	-	-	-	180.9	532.7	69.5
170	5	106	60.6	241.5	322.6	121.7	53.8	215.1	-	33.0	132.1	-	328.3	669.8	121.7
171	1	25	71.4	280.0	1680.0	-	52.0	264.0	-	-	-	-	332.0	1944.0	-
136	14	1145	97.4	123.1	231.4	76.2	38.5	121.2	7.5	-	-	-	161.6	352.6	83.7
139	3	60	100.0	126.7	450.0	35.0	46.7	186.7	-	-	-	-	173.4	636.7	35.0
166	10	370	78.7	134.6	185.4	74.0	41.1	63.8	27.6	3.2	-	3.2	178.9	249.2	104.8
South Dakota															
181	10	649	84.9	172.0	404.9	86.1	35.3	98.6	11.9	-	-	-	207.3	503.5	98.0
174B	3	85	100.0	44.7	78.8	32.9	40.0	105.9	17.6	4.7	18.8	-	89.4	203.5	50.5
179	1	28	100.0	142.9	-	142.9	25.0	-	25.0	-	-	-	167.9	-	167.9
175	1	50	100.0	50.0	-	50.0	58.0	200.0	-	-	-	-	108.0	200.0	50.0
142A & 177	2	68	100.0	119.1	-	119.1	36.8	-	36.8	-	-	-	155.9	-	155.9
Nebraska															
184	1	40	100.0	60.0	-	60.0	27.5	-	27.5	-	-	-	87.5	-	87.5
Montana															
137A	4	187	100.0	108.0	59.9	93.0	37.4	62.0	21.9	-	-	-	145.4	121.9	114.9
119B	5	1082	100.0	45.0	61.6	32.3	34.0	28.2	28.8	-	-	-	79.0	83.8	61.1
113	3	207	100.0	43.5	-	41.1	29.0	-	26.1	-	-	-	72.5	-	67.2
114 1/	1	30	21.9	123.4	116.7	56.7	56.7	309.0	-	-	-	-	180.1	416.7	56.7
2/	2	107	78.1	30.8	28.0	26.2	33.7	-	29.0	-	-	-	64.5	28.0	55.2
118	2	97	73.5	28.9	-	28.9	51.5	148.4	12.4	-	-	-	80.4	148.4	41.3
Total or average	153	7185	84.4	139.0	345.8	68.2	40.3	111.9	12.7	3.5	13.4	.4	182.8	471.1	81.3

1/ Irrigated - irrigation included in seedbed preparation.
2/ Non-irrigated.

Table 34. - Labor and power used per 100 acres in preparing seedbed, planting and cultivating corn where grown after small grains, and flax, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of corn	Proportion of corn acreage	Seedbed preparation			Planting			Cultivation after planting			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
Minnesota:	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
225A	25	453	100	223.0	892.1	46.1	80.3	156.7	4.9	462.0	1033.3	11.5	765.3	2082.1	62.5
226	15	158	100	348.1	1429.8	19.6	103.8	211.4	-	789.9	1656.9	-	1241.8	3298.1	19.6
225D	16	280	100	331.8	1296.1	78.6	116.1	232.8	-	577.1	1305.4	-	1025.0	2834.3	78.6
227A	25	2067	100	228.2	707.5	77.1	59.6	114.3	4.2	310.0	915.1	26.8	597.8	1736.9	108.1
227B	29	2055	100	326.5	1128.9	63.2	58.9	110.2	3.8	371.8	1085.0	13.9	757.2	2324.1	80.9
North Dakota															
225B	8	123	100	243.1	980.5	33.3	108.9	234.1	-	514.6	1199.2	-	866.6	2413.8	33.3
173	30	892	100	202.8	936.3	40.9	91.7	183.8	-	509.8	1269.1	-	804.3	2389.2	40.9
174A	49	3347	100	190.4	613.1	67.7	69.8	134.8	-	342.6	1029.0	19.0	602.8	1776.9	86.7
168	4	84	100	153.6	161.9	103.6	88.1	176.2	-	630.9	1242.9	9.5	872.6	1581.0	113.1
169	15	213	100	146.5	863.4	23.9	76.5	147.4	-	524.9	1132.9	-	747.9	2143.7	23.9
172	50	2054	100	170.3	629.6	41.2	72.3	144.7	-	336.6	913.3	.6	579.2	1687.6	41.8
170	35	1210	100	130.3	348.4	50.6	86.4	214.4	-	304.4	850.7	1.0	521.1	1413.5	51.6
171	36	1704	100	131.8	375.3	50.3	70.2	142.3	3.5	367.3	901.0	-	569.3	1418.6	53.8
136	37	940	100	138.7	360.7	64.1	82.8	180.9	-	390.8	879.6	1.0	612.3	1421.2	65.1
139	10	240	100	147.5	218.8	90.9	73.8	168.3	5.8	273.7	543.3	25.8	495.0	930.4	122.5
166	28	999	100	92.5	191.2	57.0	83.8	152.0	7.8	324.3	837.9	.8	500.6	1181.1	65.6
South Dakota															
181	30	1664	100	191.2	780.9	43.2	62.6	134.5	-	345.6	1056.6	27.2	599.4	1972.0	70.4
182A	27	2230	100	207.4	1009.3	19.0	55.3	109.0	.8	263.7	1036.9	7.5	526.4	2155.2	27.3
174B	31	2735	100	162.3	551.0	54.5	58.4	110.4	3.2	256.4	789.4	27.5	477.1	1450.8	85.2
180	30	3339	100	161.7	476.3	56.4	61.0	132.8	4.5	192.5	565.6	35.3	415.2	1174.7	96.2
176	38	5019	100	114.6	160.8	71.5	42.7	54.3	16.2	134.1	306.0	46.9	291.4	521.1	134.6
179	17	1258	100	21.7	28.9	14.4	80.1	121.0	40.8	136.3	336.0	34.2	238.1	485.9	89.4
182B	23	1929	100	42.9	149.8	9.3	94.9	258.6	29.1	139.8	434.9	20.2	277.6	843.3	58.6
175	23	1523	100	95.5	219.4	48.0	65.5	101.5	14.8	242.2	643.7	17.4	403.2	964.6	80.2
142A & 177	26	2831	100	81.2	71.2	67.4	57.0	99.3	19.0	115.9	249.4	40.8	254.1	419.9	127.2
Nebraska:															
184	44	4732	100	44.5	125.2	15.4	63.1	205.8	21.2	166.1	446.3	34.5	273.7	777.3	71.1
185	20	2819	100	43.5	69.6	27.5	56.5	134.6	32.3	185.1	586.5	30.5	285.1	790.7	90.3
Montana															
137A	32	1573	100	89.7	335.9	31.2	82.8	259.9	6.1	212.6	629.5	5.6	385.1	1225.3	42.9
119B	9	299	100	132.4	280.3	77.9	85.6	171.2	-	355.2	776.6	-	573.2	1228.1	77.9
118	12	303	100	135.6	584.8	31.4	103.0	212.5	13.2	273.6	665.4	2.3	512.2	1462.7	46.9
113	7	201	100	144.3	101.5	109.0	70.1	140.2	-	280.1	539.3	1.0	494.5	781.0	110.0
116	4	131	100	191.6	442.8	92.4	64.1	128.2	-	296.2	601.5	-	551.9	1172.5	92.4
120	4	207	100	81.6	385.5	18.4	97.1	503.4	-	174.9	616.4	-	355.6	1505.3	18.4
Total or average	789	49,612	100	135.6	422.7	47.7	65.9	142.8	10.7	251.0	697.9	22.9	452.5	1263.4	81.3

Table 35.-Labor and power used per 100 acres in preparing seedbed and seeding spring wheat where grown after row crops, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of spring wheat	Proportion of spring wheat acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	14	626	14.0	123.3	501.0	21.2	40.9	147.6	4.0	17.4	74.3	-	181.6	722.9	25.2
226	3	27	5.3	107.4	377.8	18.5	51.9	207.4	-	33.3	155.6	-	192.6	740.8	18.5
225D	10	431	20.9	62.4	195.4	21.6	34.8	91.0	12.1	20.4	78.4	2.1	117.6	364.8	35.8
227A	14	737	56.3	71.9	220.9	25.6	74.4	266.8	2.8	19.7	82.1	1.5	166.0	569.8	29.9
227B	25	1000	76.6	60.6	235.4	11.9	52.5	209.2	-	23.7	103.3	1.6	136.8	547.9	13.5
North Dakota															
225B	4	113	6.4	105.3	208.8	53.1	38.0	120.4	8.0	10.6	42.5	-	153.9	371.7	61.1
173	16	613	10.4	101.0	444.4	24.1	82.0	187.0	2.8	.2	.3	-	183.2	631.7	26.9
174A	34	2297	29.5	78.0	247.4	24.6	48.6	176.1	4.4	12.7	60.1	.5	139.3	483.6	29.5
168	1	30	.3	33.3	-	33.3	40.0	160.0	-	6.7	-	6.7	80.0	160.0	40.0
172	33	1582	16.2	50.9	186.7	10.4	50.4	165.9	2.4	9.9	34.3	.8	111.2	386.9	13.6
170	24	1082	17.9	88.7	524.8	18.5	67.6	201.1	-	8.7	31.2	-	165.0	757.1	18.5
171	19	1057	7.8	58.8	169.8	20.7	59.4	173.7	6.5	2.6	7.0	-	120.8	350.5	27.2
136	10	273	1.4	100.0	279.8	38.8	59.0	175.8	2.9	4.4	26.4	-	163.4	482.0	41.7
166	10	444	4.9	83.3	254.0	39.4	41.4	176.6	2.2	15.8	75.4	.7	140.5	506.0	42.3
South Dakota															
181	7	314	12.5	76.4	276.8	20.7	43.6	185.4	1.3	16.6	79.3	.6	136.6	541.5	22.6
182A	23	1184	100.0	18.7	83.3	2.0	64.6	229.4	5.2	23.2	91.0	4.0	106.5	403.7	11.2
174B	29	1926	43.4	73.5	325.2	13.0	39.1	125.1	12.8	7.9	21.3	4.0	120.5	471.6	29.8
180	28	2114	92.6	11.1	24.5	4.1	52.6	146.3	13.6	20.2	73.7	3.8	83.9	244.5	21.5
176	35	4005	44.3	11.3	18.2	6.2	32.0	52.1	19.3	9.2	19.4	4.8	52.5	89.7	30.3
179	14	1275	47.3	19.6	33.9	11.1	34.0	56.8	21.1	1.3	5.3	-	54.9	96.0	32.2
188B	21	1917	56.5	10.7	29.9	4.3	40.0	98.2	14.6	1.9	7.7	-	52.6	135.8	18.9
175	20	1402	16.5	14.6	30.4	8.8	46.8	70.7	23.2	5.1	20.3	-	66.5	121.4	32.0
142A & 177	19	2526	53.7	23.6	32.1	17.9	37.9	25.2	25.9	4.6	2.4	3.0	66.1	59.7	46.8
Nebraska															
184	36	2874	72.1	25.0	56.2	12.2	52.0	138.8	20.8	3.6	13.8	.2	80.6	208.8	33.2
185	13	2122	92.7	38.2	101.8	18.0	38.1	111.0	14.7	3.4	13.8	-	79.7	226.6	32.7
Montana															
137A	20	1018	16.2	87.1	265.8	33.6	54.3	135.6	12.6	10.5	52.3	-	151.9	453.7	46.2
119B	1	45	.5	100.0	400.0	-	51.1	200.0	-	24.4	97.8	-	175.5	697.8	-
118	3	108	1.8	10.2	61.1	-	50.0	40.7	27.8	-	-	-	60.2	101.8	27.8
115	1	30	.9	36.7	-	36.7	43.3	-	33.3	-	-	-	80.0	-	70.0
Total or average	487	33,172	14.9	42.4	142.7	14.3	46.7	125.7	13.1	9.2	33.7	1.6	98.3	302.1	29.0

Table 36. - Labor and power used per 100 acres in preparing seedbed and seeding winter wheat where grown after row crops, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of winter wheat	Proportion of winter wheat acreage	Seedbed preparation			Seeding			Cultivation after seeding		Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
South Dakota:														
182B	4	220	17.3	-	-	-	39.1	50.0	25.4	16.4	65.4	55.5	115.4	25.4
142A & 177	1	60	3.9	-	-	-	50.0	-	40.0	-	-	50.0	-	40.0
Nebraska														
184	5	316	14.1	6.0	-	6.0	83.5	134.5	5.1	-	-	89.5	134.5	11.1
185	7	760	20.5	19.2	34.2	11.3	52.9	114.7	12.1	4.3	17.4	76.4	166.3	23.4
Montana														
116	2	112	1.5	-	-	-	67.0	225.0	-	-	-	67.0	225.0	
Total or average	19	1,468	3.7	11.2	17.7	7.1	58.4	113.0	12.8	4.7	18.8	74.3	149.5	19.9

Table 37.-Labor and power used per 100 acres in preparing seedbed and seeding oats where grown after row crops, by type-of-farming areas, Northern Great Plains

State and type-of farming area	Reports	Acreage of Oats	Proportion of oats acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	5	130	7.5	103.1	300.8	34.6	46.9	187.7	-	29.2	123.1	-	179.2	611.6	34.6
226	2	28	4.5	357.1	1482.1	-	64.3	200.0	-	50.0	185.7	-	471.4	1867.8	-
225D	4	85	9.4	122.4	424.7	25.9	43.5	174.1	-	24.7	94.1	3.5	190.6	692.9	29.4
227A	17	962	62.8	67.6	166.4	31.4	64.9	239.9	6.9	18.3	63.2	2.8	150.8	469.5	41.1
227B	21	785	69.0	56.2	183.7	16.7	48.8	182.7	1.7	19.1	78.0	.9	124.1	444.4	19.3
North Dakota															
173	4	185	11.7	41.1	154.0	14.6	49.2	104.9	10.8	-	-	-	90.3	258.9	25.4
174A	18	682	30.0	60.1	146.2	29.0	46.6	174.8	2.9	11.7	43.0	3.4	118.4	364.0	35.3
172	7	278	28.0	54.3	198.2	13.3	50.4	116.6	13.0	3.2	13.0	-	107.9	327.8	26.3
170	3	104	8.6	98.1	142.3	67.3	71.2	201.9	-	14.4	57.7	-	183.7	401.9	67.3
171	2	90	7.5	54.4	-	54.4	55.6	124.4	13.3	8.9	35.6	-	118.9	160.0	67.7
136	4	91	3.5	59.3	70.3	41.8	56.1	140.7	8.8	7.7	30.8	-	123.1	241.8	50.6
166	1	20	1.3	225.0	1100.0	-	55.0	220.0	-	-	-	-	280.0	1320.0	-
South Dakota															
181	11	432	26.1	68.3	315.7	8.3	41.0	140.3	4.9	5.3	16.2	2.1	114.6	472.2	15.3
182A	24	801	95.2	19.5	81.4	2.5	64.8	249.6	1.9	21.8	97.8	2.0	106.1	428.8	6.4
174B	8	427	35.7	32.8	123.4	6.3	44.0	140.0	13.4	15.0	64.9	2.8	91.8	328.3	22.5
180	23	752	83.8	9.3	35.6	1.9	61.6	177.8	14.6	25.0	99.7	2.8	95.9	313.1	19.3
176	22	1224	62.0	2.9	7.8	1.0	38.6	53.4	23.4	11.0	25.8	5.8	52.5	87.0	30.2
179	9	443	83.9	25.1	-	25.1	23.9	2.7	23.5	-	-	-	49.0	2.7	48.6
182B	11	250	78.1	16.0	59.2	1.2	48.0	147.2	9.6	2.0	8.0	-	66.0	214.4	10.8
175	7	258	30.0	16.7	52.7	3.5	46.5	91.5	22.1	1.6	6.2	-	64.8	150.4	25.6
142A & 177	10	291	52.5	29.9	-	29.9	55.3	36.4	29.9	-	-	-	85.2	36.4	59.8
Nebraska															
184	21	666	60.8	43.4	148.9	12.9	54.5	170.6	12.8	7.4	28.5	.8	105.3	348.0	26.5
185	13	700	63.6	27.7	57.1	17.7	47.6	65.7	36.0	-	-	-	75.3	122.8	53.7
Montana															
137A	8	293	38.9	54.3	165.5	15.0	47.8	96.9	16.7	12.0	65.5	-	114.1	327.9	31.7
118	3	154	15.1	5.2	-	5.2	44.5	39.0	28.6	-	-	-	49.7	39.0	33.8
113	3	43	4.1	11.6	-	11.6	48.8	55.8	27.9	-	-	-	60.4	55.8	39.5
114	1	17	3.3	47.1	-	47.1	64.7	282.4	-	-	-	-	111.8	282.4	47.1
Total or Average	262	10,191	26.5	38.8	113.3	14.9	50.3	140.5	13.5	11.7	44.9	1.9	100.8	298.7	30.3

Table 38.-Labor and power used per 100 acres in preparing seedbed and seeding barley where grown after row crops, by type-of-farming areas, Northern Great Plains

State and type-of farming area	Reports	Acreage of barley	Proportion of barley acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	7	265	13.0	134.7	670.9	-	43.0	172.1	-	19.2	83.0	-	196.9	926.0	-
226	3	40	36.0	205.0	680.0	55.0	62.5	250.0	-	27.5	110.0	-	295.0	1040.0	55.0
225D	6	129	13.0	179.8	700.8	19.4	51.9	232.6	-	8.5	31.8	-	240.2	965.2	19.4
227A	7	305	50.2	84.9	203.9	41.6	48.5	194.1	-	17.7	78.0	-	151.1	476.0	41.6
227B	6	189	44.9	68.2	250.3	20.1	66.1	275.7	-	19.6	59.8	5.3	153.9	585.8	25.4
North Dakota															
174A	14	551	21.3	58.6	159.9	28.0	45.0	151.7	7.1	14.0	75.5	-	117.6	387.1	35.1
172	8	226	9.2	55.3	230.5	18.6	61.1	169.9	3.5	12.0	31.9	-	128.4	432.3	22.1
170	3	72	8.1	52.8	122.2	22.2	57.6	202.8	-	-	-	-	110.4	325.0	22.2
171	6	395	17.8	41.0	91.6	24.3	60.5	86.1	20.8	-	-	-	101.5	177.7	45.1
136	2	60	5.3	53.3	233.3	11.7	65.0	206.7	-	-	-	-	118.3	440.0	11.7
139	1	15	5.2	106.7	160.0	53.3	56.7	-	53.3	-	-	-	163.4	160.0	106.6
South Dakota															
181	13	671	46.6	90.0	349.6	18.5	41.7	153.8	5.4	12.8	59.0	1.8	144.5	562.4	25.7
182A	17	610	90.4	21.0	105.9	-	74.6	287.5	1.5	26.1	120.2	1.6	121.7	513.6	3.1
174B	11	810	31.7	60.5	151.7	30.0	41.6	104.1	18.3	17.0	43.7	8.0	119.1	299.5	56.3
180	18	646	78.2	10.1	37.4	2.8	53.2	135.7	15.6	26.0	95.7	3.7	89.3	268.8	22.1
176	21	1308	38.8	9.6	18.4	5.0	38.8	59.0	21.7	10.8	24.5	5.7	59.2	101.9	32.4
179	9	845	61.7	14.2	-	14.2	26.4	10.4	22.7	2.2	9.0	-	42.8	19.4	36.9
182B	18	1182	76.4	25.6	92.6	5.3	43.8	132.5	14.9	3.6	12.2	-	73.0	237.3	20.2
175	1	60	5.2	-	-	-	61.7	-	35.0	-	-	-	61.7	-	35.0
142A & 177	10	476	72.5	24.2	-	24.2	39.3	28.2	25.4	3.2	-	3.2	66.7	28.2	52.8
Nebraska															
184	24	1364	75.8	29.2	53.2	16.7	53.4	167.3	14.4	4.8	19.6	-	87.4	240.1	31.1
185	12	677	40.4	38.1	24.8	32.6	42.2	55.0	28.5	-	-	-	80.3	79.8	61.1
Montana															
137A	1	30	7.5	-	-	-	41.7	160.0	-	50.0	300.0	-	91.7	460.0	-
118	1	9	6.9	33.3	-	33.3	88.9	266.7	-	-	-	-	122.2	266.7	33.3
113	2	270	34.9	37.8	13.3	33.3	31.9	-	29.3	-	-	-	69.7	13.3	62.6
Total or average	221	11205	27.7	39.9	114.1	16.3	46.4	121.3	15.1	10.0	37.0	1.9	96.3	272.4	33.3

Table 39.- Labor and power used per 100 acres in preparing seedbed and seeding spring wheat where alternated with summer fallow, by type-of-farming areas, Northern Great Plains

State and type-of farming area	Reports	Acreage of Spring Wheat	Proportion of Spring Wheat Acreage	Seedbed Preparation			Seeding			Cultivation after Seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	19	1014	22.7	281.3	1033.8	66.8	42.4	161.7	2.0	11.8	42.1	2.6	335.5	1237.6	71.4
226	2	42	8.3	190.5	333.3	107.1	47.6	190.5	-	23.8	95.2	-	261.9	619.0	107.1
225D	3	206	10.0	326.7	1380.6	48.5	50.0	200.0	-	22.8	122.3	-	399.5	1702.9	48.5
227B	1	35	2.7	191.4	385.7	114.3	37.1	148.6	-	20.0	80.0	-	248.5	614.3	114.3
North Dakota															
225B	3	165	9.4	276.4	568.5	138.8	45.4	80.0	12.7	17.6	65.4	4.2	339.4	713.9	155.7
173	21	1490	25.2	216.5	839.7	72.2	63.8	189.9	1.7	3.1	15.4	-	283.4	1045.0	73.9
174A	10	653	8.4	236.6	734.3	86.4	48.9	178.9	4.1	4.9	23.9	-	290.4	937.1	90.5
168	36	3838	41.2	218.8	718.8	84.9	41.5	136.6	5.2	13.2	49.7	3.1	273.5	905.1	93.2
169	14	1520	12.0	292.2	1420.5	51.8	59.3	214.2	2.6	2.5	14.4	-	354.0	1649.1	54.4
172	5	350	3.6	130.3	170.0	89.4	51.7	162.3	5.4	6.6	26.3	-	188.6	358.6	94.8
170	3	180	3.0	237.8	733.3	81.7	77.8	217.8	-	-	-	-	315.6	951.1	81.7
171	3	100	.7	200.0	312.0	108.0	48.0	16.0	34.0	7.0	21.0	-	255.0	349.0	142.0
136	26	2284	12.0	169.3	344.3	93.2	52.9	154.4	6.7	5.4	23.5	-	227.6	522.2	99.9
139	12	1500	24.9	170.2	319.1	104.1	49.2	107.5	13.2	2.6	10.8	-	222.0	437.4	117.3
166	16	2354	26.0	150.0	239.2	89.5	37.8	145.1	4.8	4.5	18.8	.6	192.3	403.1	94.9
South Dakota															
175	1	20	.2	150.0	-	150.0	65.0	-	35.0	-	-	-	215.0	-	185.0
Montana															
137A	16	1315	20.9	200.8	730.6	69.1	51.1	174.3	7.2	12.1	66.6	.6	264.0	971.5	76.9
119B	13	1943	24.1	171.4	175.0	136.9	40.7	52.2	23.8	-	-	-	212.1	227.2	160.7
118	21	2331	40.0	154.3	277.5	102.7	54.2	77.8	23.2	.6	3.6	-	209.1	358.9	125.9
113	35	7805	41.6	116.6	4.4	115.6	36.3	10.7	29.6	1.6	-	1.6	154.5	15.1	146.8
114 1/	7	815	6.5	224.9	147.4	153.4	41.8	25.0	28.8	-	-	-	266.7	172.4	182.2
2/	37	8538	67.6	128.9	27.8	124.3	34.6	14.8	24.4	.9	-	.9	164.4	42.6	149.6
115	6	1407	42.4	75.7	-	75.7	21.0	-	16.6	-	-	-	96.7	-	92.3
116	14	2128	38.5	105.2	47.6	96.2	43.0	67.3	20.2	-	-	-	148.2	114.9	116.4
87D 1/	2	40	3.1	302.5	1585.0	-	60.0	190.0	-	-	-	-	362.5	1775.0	-
2/	7	880	67.6	316.5	1413.5	61.9	61.0	192.5	5.0	7.6	30.5	-	385.1	1636.5	66.9
88A 1/	3	163	3.5	546.0	2123.4	47.2	54.6	169.3	-	17.8	89.0	-	618.4	2381.7	47.2
2/	31	4523	95.7	241.1	740.9	123.9	49.2	91.4	15.5	2.6	8.8	.9	292.9	841.1	140.3
120	8	570	49.6	290.4	843.9	126.1	55.8	115.8	23.2	-	-	-	346.2	959.7	149.3
Total or Average	375	48209	21.6	174.2	375.0	103.9	43.3	83.0	16.8	3.6	13.3	.9	221.1	471.3	121.6

1/ Irrigated - irrigation inoluded in seedbed preparation.
2/ Non-irrigated.

Table 40. - Labor and power used per 100 acres in preparing seedbed and seeding winter wheat where alternated with summer fallow, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of winter wheat	Proportion of winter wheat acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Nebraska															
184	1	30	1.3	220.0	226.7	163.3	26.7	-	26.7	-	-	-	246.7	226.7	190.0
185	1	540	14.6	134.8	-	134.8	67.6	-	55.6	-	-	-	202.4	-	190.4
Montana															
113	2	680	53.8	94.1	-	94.1	31.2	-	20.2	-	-	-	125.3	-	114.3
114	1	120	100.0	102.5	-	102.5	43.6	-	33.3	-	-	-	146.1	-	135.8
115	20	8,675	92.0	116.6	2.3	102.8	23.3	5.5	14.9	-	-	-	139.9	7.8	117.7
116	25	3,551	48.0	126.8	190.5	96.4	36.6	25.6	20.6	1.5	6.0	-	164.9	222.1	117.0
87D	8	1,557	100.0	204.9	624.6	97.1	57.4	147.5	10.3	9.6	38.5	-	271.9	810.6	107.4
88A	1/ 3	297	12.1	385.8	1279.1	122.2	46.4	78.1	12.1	39.4	162.6	6.1	471.6	1519.8	140.4
	2/ 19	1,902	77.8	208.3	752.0	92.2	47.1	90.1	14.4	2.5	10.8	.5	257.9	852.9	107.1
120	14	2,733	67.4	134.2	354.6	88.2	43.5	90.5	19.2	-	-	-	177.7	445.1	107.4
Total or average	94	20,085	49.8	140.1	221.8	99.2	35.2	40.3	17.5	1.8	7.5	.1	177.1	269.6	116.8

1/ Irrigated - Irrigation included in seedbed preparation. 2/ Non-irrigated.

Table 41. - Labor and power used per 100 acres in preparing seedbed and seeding oats where alternated with summer fallow, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of oats	Proportion of oats acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	1	30	1.7	293.3	1,573.3	-	56.7	226.7	-	26.7	106.7	-	376.7	1,906.7	-
North Dakota															
225B	2	48	6.9	172.9	350.0	85.4	33.3	83.3	12.5	10.4	16.7	6.2	216.6	450.0	104.1
168	1	60	2.6	40.0	-	40.0	13.3	-	13.3	6.7	-	6.7	60.0	-	60.0
172	1	15	1.5	233.3	1,186.7	-	86.7	266.7	-	-	-	-	320.0	1,433.4	-
Montana															
119B	2	36	8.6	211.1	544.4	113.9	44.4	100.0	22.2	-	-	-	255.5	644.4	136.1
118	2	55	5.4	143.6	65.4	127.3	38.2	-	32.7	-	-	-	181.8	65.4	160.0
113	8	272	26.0	149.3	381.6	80.9	45.2	75.0	20.6	-	-	-	194.5	456.6	101.5
114	1/ 2	40	7.7	300.0	100.0	150.0	37.5	-	32.5	-	-	-	337.5	100.0	182.5
	2/ 9	189	36.3	128.6	-	128.6	44.4	-	31.7	-	-	-	173.0	-	160.3
115	1	40	14.0	102.5	-	102.5	30.0	-	20.0	-	-	-	132.5	-	122.5
116	2	75	28.4	105.3	-	105.3	44.0	-	41.3	-	-	-	149.3	-	146.6
88A	1/ 1	10	2.9	220.0	590.0	100.0	50.0	180.0	-	40.0	200.0	-	310.0	970.0	100.0
	2/ 13	190	55.7	304.7	973.7	144.7	73.1	129.5	12.1	6.3	15.8	3.2	384.1	1,119.0	160.0
120	1	25	14.5	164.0	-	164.0	32.0	-	24.0	-	-	-	196.0	-	188.0
Total or average	46	1,085	2.8	176.6	371.8	105.5	47.0	60.1	21.8	3.0	8.3	1.2	226.6	440.2	128.5

1/ Irrigated - Irrigation included in seedbed preparation. 2/ Non-irrigated.

Table 42. - Labor and power used per 100 acres in preparing seedbed and seeding barley where alternated with summer fallow by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of barley	Proportion of barley acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota:															
225A	1	40	2.0	150.0	-	150.0	50.0	200.0	-	-	-	-	200.0	200.0	150.0
225D	2	75	7.5	394.7	858.7	180.0	90.7	101.3	65.3	10.7	-	10.7	496.1	960.0	256.0
Montana															
137A	1	40	10.0	407.5	2,105.0	-	72.5	220.0	-	-	-	-	480.0	2,325.0	-
118	2	73	56.2	167.1	306.8	90.4	41.1	65.8	19.2	8.2	32.9	-	216.4	405.5	109.6
113	5	134	17.3	126.9	29.8	119.4	42.5	-	31.3	8.2	14.9	4.5	177.6	44.7	155.2
114	1/3	119	33.4	231.1	70.6	161.3	42.0	-	29.4	-	-	-	273.1	70.6	190.7
	2/3	35	9.8	148.6	-	148.6	42.9	-	22.9	-	-	-	191.5	-	171.5
115	1	30	14.0	100.0	-	100.0	20.0	-	16.7	-	-	-	120.0	-	116.7
88A	2	12	37.5	416.7	1,583.3	100.0	83.3	166.7	16.7	16.7	83.3	-	516.7	1,833.3	116.7
Total or average	20	558	1.4	218.3	581.0	126.7	51.1	107.0	27.8	4.8	14.5	2.5	274.2	702.5	157.0

1/ Irrigated - Irrigation included in seedbed preparation.
2/ Non-irrigated.

Table 43.-Labor and power used per 100 acres in preparing seedbed and seeding flax where alternated with summer fallow, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of flax	Proportion of flax acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
				Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Percent	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota															
225A	10	341	35.4	214.4	290.3	153.1	33.7	69.2	16.4	21.4	85.3	1.2	269.5	444.8	170.7
North Dakota															
225B	3	210	60.0	126.2	71.4	113.3	37.1	106.7	10.5	-	-	-	163.3	178.1	123.8
173	1	25	11.3	224.0	1344.0	-	44.0	176.0	-	-	-	-	268.0	1520.0	-
168	1	20	7.8	115.0	-	115.0	40.0	160.0	-	5.0	-	5.0	160.0	160.0	120.0
Montana															
118	1	18	13.6	50.0	-	50.0	38.9	-	33.3	-	-	-	88.9	-	83.3
Total or average	16	614	7.2	176.6	240.3	129.0	35.6	87.3	13.7	12.0	47.4	.8	224.2	375.0	143.5

Table 44.-Summary of labor and power used per 100 acres in preparing seedbed and seeding small grains and flax, Northern Great Plains

Crop	Reports	Acreage	Seedbed preparation			Seeding			Cultivation after seeding			Total		
			Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Number	Acres	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Winter wheat	211	40,302	77.5	121.2	55.4	35.3	38.4	19.9	1.1	4.6	.1	113.9	164.2	75.4
Spring wheat	1688	23,091	99.6	255.4	51.5	47.5	103.9	15.4	5.4	20.7	.8	152.5	380.0	67.7
Oats	957	38,521	108.9	356.1	38.9	52.8	145.2	10.8	9.3	37.0	1.2	171.0	538.3	50.9
Barley	792	40,410	98.2	317.8	36.9	48.0	129.0	12.3	8.9	33.6	1.6	155.1	480.4	50.8
Flax	192	8,516	140.5	336.9	71.1	41.0	115.7	12.5	4.2	16.1	.4	185.7	468.7	84.0

Table 45.-Labor and power used per 100 acres in harvesting and hauling wheat where cut with a combine, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of wheat cut with combine	Proportion of wheat acreage cut with combine	Yield per harvested acre	Harvesting			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota														
225A	2	145	3.3	20.9	73.1	-	50.3	28.3	16.6	20.0	101.4	16.6	50.3	20.0
225D	2	478	23.1	15.3	82.4	-	41.2	26.2	-	26.2	108.6	-	41.2	26.2
North Dakota														
225B	3	402	22.9	13.3	83.8	32.8	45.3	69.2	-	69.2	153.0	32.8	45.3	69.2
173	4	510	8.6	10.6	52.9	-	28.6	32.0	-	32.0	84.9	-	28.6	32.0
174A	3	380	7.9	3.8	51.8	-	34.7	20.8	16.8	12.4	72.6	16.8	34.7	12.4
168	2	434	4.8	8.5	100.0	-	54.4	45.6	73.7	8.8	145.6	73.7	54.4	8.8
169	5	1,085	8.6	11.6	63.7	-	28.3	32.8	32.1	16.8	96.5	32.1	28.3	16.8
172	3	646	8.3	3.9	81.7	-	40.9	29.0	19.2	19.4	110.7	19.2	40.9	19.4
171	17	5,495	42.9	6.2	72.1	-	36.0	39.1	10.0	33.6	111.2	10.0	36.0	33.6
136	34	9,802	57.6	6.2	66.6	-	31.9	38.6	16.2	31.1	105.2	16.2	31.9	31.1
139	17	4,880	81.0	8.5	64.9	-	33.0	45.5	25.6	32.2	110.4	25.6	33.0	32.2
166	7	616	10.6	5.4	70.0	-	38.6	58.0	11.0	50.0	128.0	11.0	38.6	50.0
South Dakota														
181	1	225	10.0	15.0	83.6	-	50.2	51.1	-	51.1	134.7	-	50.2	51.1
174B	2	324	7.2	11.6	51.8	66.7	20.4	76.5	143.2	4.9	128.3	209.9	20.4	4.9
176	7	3,091	36.7	11.1	60.0	-	30.0	45.0	35.3	29.3	105.0	35.3	30.0	29.3
179	10	3,215	74.4	7.3	46.3	-	23.1	42.0	6.0	39.0	88.3	6.0	23.1	39.0
182B	3	620	40.1	17.3	60.3	-	30.2	24.7	10.6	19.4	85.0	10.6	30.2	19.4
175	10	4,746	60.6	9.8	46.4	-	23.2	29.3	5.8	22.2	75.7	5.8	23.2	22.2
142A & 177	12	3,607	80.4	12.9	67.4	-	34.7	92.7	74.7	40.5	160.1	74.7	34.7	40.5
Nebraska														
184	19	3,612	78.3	6.3	67.7	-	34.4	45.4	12.3	34.4	113.1	12.3	34.4	34.4
185	16	4,614	95.4	8.3	66.8	-	32.0	37.3	11.2	28.8	104.1	11.2	32.0	28.8
Montana														
137A	9	1,919	38.7	7.9	69.9	-	32.0	56.8	35.8	38.8	126.7	35.8	32.0	38.8
119B	14	6,397	68.2	7.9	66.7	-	33.7	55.4	27.2	42.7	122.1	27.2	33.7	42.7
118	15	2,041	64.7	4.6	72.0	-	37.2	39.5	16.8	31.1	111.5	16.8	37.2	31.1
113	43	14,187	81.5	6.6	57.9	-	29.7	34.9	21.5	24.0	92.8	21.5	29.7	24.0
114	40	11,562	95.3	12.3	60.6	-	29.3	46.3	12.6	38.6	106.9	12.6	29.3	38.6
115	24	11,272	99.6	9.5	50.7	-	29.8	25.9	1.6	25.0	76.6	1.6	29.8	25.0
116	32	10,320	89.6	8.2	55.6	-	26.8	27.6	15.1	20.2	83.2	15.1	26.8	20.2
87D	3	824	46.5	8.4	94.8	-	36.2	69.3	20.4	36.6	164.1	20.4	36.2	36.6
88A	23	4,258	64.4	11.7	70.2	17.5	40.3	64.5	63.6	28.1	134.7	81.1	40.3	28.1
120	12	4,635	88.9	5.5	70.8	-	36.0	30.6	15.6	22.8	101.4	15.6	36.0	22.8
Total or average	394	116,342	50.2	8.6	61.9	.9	31.4	40.9	19.5	29.8	102.8	20.4	31.4	29.8

Table 46. - Labor and power used per 100 acres in harvesting and hauling oats where cut with a combine, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of oats cut with combine	Proportion of oats acreage cut with combine	Yield per harvested acre	Harvesting		Hauling			Total			
					Man	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
North Dakota													
225B	2	175	31.5	31.1	90.3	57.1	42.9	-	42.9	133.2	-	57.1	42.9
171	1	25	5.3	10.0	128.0	64.0	24.0	-	24.0	152.0	-	64.0	24.0
South Dakota													
181	1	120	8.2	35.0	50.0	33.3	108.3	133.3	41.7	158.3	133.3	33.3	41.7
176	3	187	9.7	35.1	53.0	26.5	43.6	121.3	-	96.6	121.3	26.5	-
179	4	140	28.5	33.1	55.7	27.9	54.3	31.4	38.6	110.0	31.4	27.9	38.6
182B	2	90	28.1	30.2	53.3	33.3	26.7	26.7	13.3	80.0	26.7	33.3	13.3
175	1	120	15.1	14.0	56.7	36.7	40.0	80.0	-	96.7	80.0	36.7	-
Nebraska													
184	6	210	25.9	31.7	61.9	31.0	52.9	19.0	26.2	114.8	19.0	31.0	26.2
Montana													
118	1	20	16.4	3.0	60.0	30.0	15.0	30.0	-	75.0	30.0	30.0	-
114	3	30	8.3	19.7	86.7	46.7	20.0	13.3	13.3	106.7	13.3	46.7	13.3
116	2	15	17.1	30.0	64.5	32.3	12.9	-	12.9	77.4	-	32.3	12.9
88A	3	41	12.5	5.9	70.7	56.1	41.5	82.9	-	112.2	82.9	56.1	-
Total or average	29	1,173	4.6	28.5	63.9	36.8	49.4	54.1	22.0	113.3	54.1	36.8	22.0

Table 47. - Labor and power used per 100 acres in harvesting and hauling barley where cut with a combine, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of barley cut with combine	Proportion of barley acreage cut with combine	Yield per harvested acre	Harvesting			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota														
225A	1	40	2.4	15.4	55.0	-	55.0	110.0	220.0	-	165.0	220.0	55.0	-
225D	2	267	26.9	8.6	80.9	-	40.4	40.4	-	40.4	121.3	-	40.4	40.4
North Dakota														
225B	2	37	14.9	30.0	86.5	-	54.0	32.4	-	32.4	118.9	-	54.0	32.4
168	4	405	17.5	5.6	54.8	-	31.8	84.9	161.0	4.4	139.7	161.0	31.8	4.4
172	1	25	2.0	4.0	96.0	-	48.0	48.0	-	48.0	144.0	-	48.0	48.0
171	6	370	23.6	7.1	80.0	-	40.0	31.1	24.3	14.3	111.1	24.3	40.0	14.3
136	6	273	41.1	9.2	74.0	-	37.0	24.5	-	24.5	98.5	-	37.0	24.5
139	4	125	80.6	9.8	75.2	-	40.8	44.8	38.4	24.8	120.0	38.4	40.8	24.8
South Dakota														
181	1	60	5.1	30.0	83.3	-	50.0	43.3	-	43.3	126.6	-	50.0	43.3
174B	2	64	2.5	25.0	54.7	46.9	23.4	101.6	203.1	-	156.3	250.0	23.4	-
176	4	655	19.4	22.6	64.1	-	32.1	37.4	71.2	11.0	101.5	71.2	32.1	11.0
179	5	535	60.1	25.5	53.0	-	26.5	54.4	10.8	49.0	107.4	10.8	26.5	49.0
182B	3	290	18.8	28.4	65.2	-	35.5	36.2	25.2	23.5	101.4	25.2	35.5	23.5
175	5	440	42.4	16.6	60.9	-	30.4	50.7	51.4	25.0	111.6	51.4	30.4	25.0
142A and 177	4	140	34.5	22.7	52.1	-	31.4	57.1	31.4	25.7	109.2	31.4	31.4	25.7
Nebraska														
184	15	935	54.7	27.1	67.7	-	34.4	80.4	54.6	38.3	148.1	54.6	34.4	38.3
185	10	662	47.9	12.6	69.3	-	34.0	36.0	17.8	26.4	105.3	17.8	34.0	26.4
Montana														
137A	3	80	21.2	27.8	97.5	-	37.5	65.0	15.0	57.5	162.5	15.0	37.5	57.5
118	1	48	38.4	18.7	100.0	-	50.0	50.0	-	50.0	150.0	-	50.0	50.0
113	3	120	29.1	10.0	56.7	-	28.3	29.2	-	29.2	85.9	-	28.3	29.2
114	6	155	49.7	20.6	81.3	-	46.4	45.8	5.2	43.2	127.1	5.2	46.4	43.2
115	1	4	100.0	5.0	100.0	-	50.0	25.0	-	25.0	125.0	-	50.0	25.0
88A	1	6	18.8	6.7	66.7	-	66.7	66.7	133.3	-	133.4	133.3	66.7	-
Total or average	90	5,736	18.9	18.2	67.0	.5	34.5	51.8	44.1	27.6	118.8	44.6	34.5	27.6

Table 48. - Labor and power used per 100 acres in harvesting and hauling flax where cut with a combine by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of flax cut with combine	Proportion of flax acreage cut with combine	Yield per harvested acre	Harvesting			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota														
225A	2	165	18.8	5.6	54.6	-	54.6	31.5	63.0	-	86.1	63.0	54.6	-
North Dakota														
225B	2	130	46.4	3.5	90.0	-	56.9	36.2	-	36.2	126.2	-	56.9	36.2
173	1	50	41.6	1.5	88.0	-	44.0	88.0	176.0	-	176.0	176.0	44.0	-
174A	1	70	15.9	8.0	65.7	-	32.9	-	-	-	65.7	-	32.9	-
168	1	45	17.6	4.0	35.6	-	17.8	17.8	57.8	-	53.4	57.8	17.8	-
136	1	65	34.2	1.4	67.7	-	33.8	3.1	-	3.1	70.8	-	33.8	3.1
166	1	30	21.6	9.0	93.3	-	46.7	40.0	80.0	-	133.3	80.0	46.7	-
South Dakota														
181	1	150	19.6	14.0	83.3	-	50.0	47.3	-	47.3	130.6	-	50.0	47.3
174B	1	40	32.0	8.0	80.0	-	50.0	30.0	-	30.0	110.0	-	50.0	30.0
179	1	28	100.0	8.0	57.1	-	28.6	28.6	-	28.6	85.7	-	28.6	28.6
142A & 177	1	28	100.0	10.0	32.1	-	32.1	64.3	64.3	32.1	96.4	64.3	32.1	32.1
Nebraska														
184	1	40	100.0	8.0	40.0	-	20.0	32.5	-	32.5	72.5	-	20.0	32.5
Montana														
137A	1	40	53.3	2.0	55.0	-	27.5	5.0	-	5.0	60.0	-	27.5	5.0
119B	2	190	59.0	1.0	47.4	10.5	18.4	9.0	-	9.0	56.4	10.5	18.4	9.0
113	2	165	79.7	2.9	53.3	-	33.3	19.4	-	19.4	72.7	-	33.3	19.4
114	1	98	71.5	5.0	88.8	-	29.6	29.6	-	29.6	118.4	-	29.6	29.6
Total or average	20	1,334	24.8	5.3	65.2	1.5	37.7	27.5	19.5	18.2	92.7	21.0	37.7	18.2

Table 49.-Labor and power used per 100 acres in harvesting, threshing, and hauling wheat where cut with a binder and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of farming area	Reports	Acreage of wheat cut with binder	Proportion of acreage cut with binder	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horee	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
Minnesota:	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
225A	40	4303	96.7	14.0	137.8	242.2	3.2	142.1	228.5	14.7	55.8	93.5	7.4	335.7	564.2	17.9	7.4
226	9	3873	100.0	8.3	150.5	273.8	-	114.9	190.6	13.4	23.4	46.0	-	288.8	510.4	13.4	-
225D	19	1587	76.9	14.1	123.8	238.7	1.8	143.5	217.3	15.7	54.8	77.2	15.4	322.1	533.2	17.5	15.4
227A	20	1039	100.0	5.4	122.9	180.3	13.6	52.8	85.7	10.3	16.3	27.7	2.1	192.0	293.7	23.9	2.1
227B	27	1298	100.0	7.5	144.6	179.7	18.5	114.1	182.4	13.5	39.1	59.6	8.3	297.8	421.7	32.0	8.3
North Dakota:																	
225B	10	1356	77.1	12.7	154.2	158.2	18.2	162.8	193.4	16.7	49.8	53.5	23.0	366.8	405.1	34.9	23.0
173	33	5386	91.4	8.5	121.8	167.2	11.5	94.9	138.4	12.0	23.9	31.6	7.6	240.6	337.2	23.5	7.6
174A	27	4443	92.1	14.4	150.9	226.9	-	143.5	186.2	19.1	57.7	92.2	10.4	352.1	505.3	19.1	10.4
168	38	8669	95.2	6.2	113.3	220.9	1.6	77.4	113.2	8.8	33.2	61.0	1.4	223.9	395.1	10.4	1.4
169	35	11580	91.4	9.6	112.9	174.2	7.7	111.4	153.6	11.5	32.1	39.8	11.7	256.4	367.6	18.8	11.7
172	9	459	5.9	3.6	121.4	199.3	9.4	53.2	71.0	10.9	19.8	29.6	1.5	194.4	299.9	20.3	1.5
170	4	400	11.3	8.6	117.5	233.0	-	101.5	109.0	20.2	30.0	54.0	-	249.0	396.0	20.2	-
171	5	539	4.2	4.8	98.9	224.7	-	123.2	175.9	15.6	31.7	63.1	.2	253.8	463.7	15.6	.2
136	46	6453	37.9	6.3	109.0	187.8	7.7	83.5	126.3	12.0	21.6	21.8	10.6	214.1	335.9	19.7	10.6
139	8	1146	19.0	7.0	107.3	192.0	7.6	96.0	137.7	13.0	27.3	30.5	12.0	230.6	360.2	20.6	12.0
166	27	4345	74.9	4.7	114.3	176.3	11.6	59.9	97.3	8.6	20.1	8.3	12.9	194.3	282.4	20.2	12.9
South Dakota:																	
181	21	2027	90.0	15.8	130.8	160.0	17.2	152.7	254.8	16.7	101.1	195.3	2.1	384.6	610.1	33.9	2.1
182A	21	1132	100.0	14.7	135.5	187.3	6.3	192.5	297.5	21.8	101.2	182.7	6.5	429.2	667.5	28.1	6.5
174B	27	3999	88.4	13.2	104.4	121.9	17.2	108.7	167.8	13.9	65.2	111.3	.2	278.3	401.0	31.1	.2
180	28	2284	100.0	14.8	120.5	170.2	10.1	200.3	301.6	26.8	62.2	74.5	5.2	383.0	546.3	36.9	5.2
176	19	3080	36.5	14.2	97.0	38.8	27.1	177.7	271.4	26.1	83.2	135.6	24.8	357.9	445.8	53.2	24.8
179	9	1107	25.6	13.6	99.9	28.6	36.4	207.0	321.6	25.0	50.1	93.2	3.5	357.0	443.4	61.4	3.5
182B	21	2795	59.9	16.2	127.1	58.5	24.4	237.6	378.5	26.5	117.2	164.5	23.5	481.9	601.5	50.9	23.5
175	5	840	10.7	13.3	121.8	151.4	11.7	144.0	213.3	14.9	31.2	42.9	7.4	297.0	407.6	26.6	7.4
142A&177	6	799	17.8	13.9	132.5	53.6	28.7	129.0	181.5	16.6	47.3	14.5	32.8	308.8	249.6	45.3	32.8
Nebraska:																	
184	11	673	14.6	8.0	139.8	165.5	15.9	169.4	256.2	21.1	47.0	39.8	19.3	356.2	461.5	37.0	19.3
185	2	220	4.6	13.2	110.9	-	31.8	152.7	230.0	19.1	90.0	-	90.0	353.6	230.0	50.9	90.0
Montana:																	
137A	21	2310	46.5	8.3	116.4	232.6	-	127.9	191.5	17.0	48.9	55.6	22.6	293.2	479.7	17.0	22.6
119B	1	285	3.1	20.0	144.1	196.5	-	93.3	160.0	13.3	40.0	-	40.0	277.4	356.5	13.3	40.0
118	12	911	29.0	4.0	120.5	242.8	4.8	79.9	102.3	16.4	25.0	19.5	15.3	225.4	364.6	21.2	15.3
113	2	214	1.2	3.7	151.9	269.2	-	30.8	32.7	3.3	8.4	-	8.4	191.1	301.9	3.3	8.4
114	7	564	4.7	14.8	142.4	146.8	22.5	172.0	245.7	19.5	45.2	44.3	21.3	359.6	436.8	42.0	21.3
115	1	50	.4	12.0	132.0	266.0	-	100.0	400.0	50.0	-	-	-	232.0	666.0	50.0	-
116	8	1033	9.0	7.6	122.4	251.7	-	106.9	163.8	11.9	24.5	41.8	3.6	253.8	457.3	11.9	3.6
87D	9	366	20.7	14.3	200.8	336.6	-	278.7	425.7	32.5	73.2	113.1	16.7	552.7	875.4	32.5	16.7
88A	23	2354	35.6	16.4	149.6	257.3	2.3	233.2	332.3	23.0	58.5	74.3	20.1	441.3	663.9	25.3	20.1
120	1	76	1.5	10.0	131.6	263.2	-	92.1	157.9	13.2	26.3	-	13.2	250.0	421.1	13.2	13.2
Total or average	612	83995	36.3	10.2	122.6	183.9	8.9	123.4	183.7	14.9	44.5	64.7	10.2	290.5	432.3	23.8	10.2

Table 50. - Labor and power used per 100 acres in harvesting, threshing, and hauling oats where cut with a binder and threshed in a stationary separator by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of oats cut with binder	Proportion of oats acreage cut with binder	Yield per harvested acre	Harvesting			Threshing			Hauling			Total		
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Men	Horse	Tractor	Truck
Minnesota:	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
225A	35	1,465	100.0	20.5	136.3	198.8	5.7	149.4	241.2	14.1	33.6	49.8	5.3	319.3	489.8	19.8	5.3
226	12	543	100.0	16.2	156.4	286.2	-	128.2	204.0	16.9	33.2	59.7	-	317.8	549.9	16.9	-
225D	19	810	100.0	27.2	133.2	229.1	5.9	145.3	227.9	16.4	42.1	75.3	1.4	320.6	532.3	22.3	1.4
227A	22	1,132	100.0	7.3	134.7	192.3	8.6	60.1	100.9	9.0	15.4	29.7	.5	210.2	322.9	17.6	.5
227B	24	905	100.0	17.5	153.5	252.6	13.0	141.8	218.6	15.4	33.3	44.6	7.4	328.6	515.8	28.4	7.4
North Dakota																	
225B	7	380	68.5	13.2	138.7	122.1	24.0	114.5	141.6	10.3	20.8	15.8	12.9	274.0	279.5	34.3	12.9
173	31	1,508	100.0	15.5	114.4	186.5	7.2	108.6	162.5	13.9	25.7	38.9	4.9	248.7	387.9	21.1	4.9
174A	16	965	100.0	30.5	143.6	242.7	1.2	136.5	178.9	18.3	31.3	60.8	3.3	311.4	482.4	19.5	3.3
168	23	1,494	100.0	6.4	102.1	227.4	-	72.7	106.6	8.6	14.7	30.5	-	189.5	364.5	8.6	-
169	32	1,529	100.0	12.2	107.0	182.5	5.3	141.0	189.7	13.7	36.3	53.2	9.4	284.3	425.4	19.0	9.4
172	7	258	54.0	12.2	141.5	216.7	9.7	137.2	198.4	23.6	38.8	77.5	-	317.5	492.6	33.3	-
170	10	402	69.7	12.1	147.3	256.0	3.5	114.9	160.2	17.4	27.4	52.2	1.2	289.6	468.4	20.9	1.2
171	3	59	12.5	15.2	118.6	237.3	-	128.8	162.7	30.5	54.2	54.2	13.6	301.6	454.2	30.5	13.6
136	18	610	100.0	10.8	126.2	147.5	13.1	83.3	119.7	-	19.9	23.0	8.1	228.4	290.2	13.1	8.1
139	7	235	100.0	11.9	107.2	194.0	2.6	129.4	177.9	24.3	24.7	22.1	13.2	261.3	394.0	26.9	13.2
166	14	924	100.0	37.4	151.2	245.0	3.8	161.3	254.8	22.8	33.4	30.1	15.4	345.9	529.9	26.6	15.4
South Dakota																	
181	26	1,340	91.8	38.3	128.4	208.7	6.9	220.5	370.9	28.7	56.2	113.6	.4	405.1	693.2	35.6	.4
182A	24	811	100.0	34.9	136.0	203.7	5.2	240.1	367.9	27.2	85.4	150.2	2.5	461.5	721.8	32.4	2.5
174B	25	1,175	100.0	35.2	112.0	151.2	15.3	210.0	327.5	27.8	57.8	114.4	-	379.8	593.1	43.1	-
180	27	897	100.0	31.0	130.3	228.3	4.7	241.8	371.9	31.8	56.7	89.4	5.9	428.8	689.6	36.5	5.9
176	32	1,748	90.3	35.8	93.9	59.7	28.7	224.3	345.0	29.7	57.5	96.3	7.6	375.7	501.0	58.4	7.6
179	6	351	71.5	27.9	56.1	37.6	28.2	219.4	338.5	27.6	51.6	38.8	32.2	327.1	414.9	55.8	32.2
182B	10	230	71.9	29.3	118.7	128.7	12.6	250.9	386.1	30.9	79.6	129.6	4.4	449.2	644.4	43.5	4.4
175	14	643	81.1	28.2	118.5	162.4	11.0	136.9	210.9	14.6	43.6	39.2	22.7	299.0	412.5	25.6	22.7
142A & 177: Nebraska:	10	401	100.0	31.5	134.2	122.7	19.2	197.0	274.3	24.4	52.4	29.9	29.9	383.6	426.9	43.6	29.9
184	17	540	66.7	27.4	155.6	91.8	27.6	224.1	326.7	27.4	71.1	86.7	13.3	450.8	505.2	55.0	13.3
185	8	625	100.0	20.7	131.0	92.2	23.4	165.9	244.8	21.0	33.6	2.9	28.0	330.5	339.9	44.4	28.0
Montana																	
137A	13	401	92.0	12.7	109.7	219.4	-	137.2	208.0	19.2	31.9	54.9	2.2	278.8	482.3	19.2	2.2
119B	4	150	100.0	13.1	186.7	257.3	12.7	54.0	45.3	9.3	95.3	21.3	84.7	336.0	323.9	22.0	84.7
118	4	102	83.6	11.3	114.7	239.2	-	75.5	76.5	12.8	26.5	27.4	12.8	216.7	343.1	12.8	12.8
113	3	47	100.0	23.3	131.9	93.6	42.6	176.6	268.1	31.9	29.8	8.5	36.2	338.3	370.2	74.5	36.2
114	13	330	91.7	19.6	117.6	160.0	16.1	160.9	229.1	26.4	28.2	21.8	14.2	306.7	410.9	42.5	14.2
116	4	75	82.9	11.2	158.7	290.7	-	221.3	325.3	42.7	76.0	138.7	6.7	456.0	754.7	42.7	6.7
87D	8	214	100.0	35.1	219.2	319.6	-	512.6	770.1	60.3	139.2	273.8	2.3	871.0	1363.5	60.3	2.3
88A	14	286	87.5	22.4	140.9	240.6	-	194.1	247.6	19.2	65.7	117.5	3.8	400.7	605.7	19.2	3.8
Total or Average:	542	23,585	91.9	22.9	126.1	186.4	9.8	159.9	241.8	19.7	41.5	63.9	7.5	327.5	492.1	29.5	7.5

Table 51- Labor and power used per 100 acres in harvesting, threshing and hauling barley where cut with a binder and threshed in a stationary separator by type-of-farming areas, Northern Great Plains.

State and type-of-farming area	Reports	Acreage of barley cut with binder	Proportion of barley acreage cut with binder	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
Minnesota:	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
225A	34	1660	97.6	17.2	129.5	183.9	8.1	138.7	216.8	14.2	32.8	53.0	5.7	301.0	453.7	22.3	5.7
226	7	97	100.0	14.8	165.0	239.2	6.2	103.1	165.0	16.5	28.9	39.2	-	297.0	443.4	22.7	-
225D	18	726	73.1	19.8	126.0	217.6	4.8	144.2	230.6	16.2	52.9	87.0	7.7	323.1	535.2	21.0	7.7
227A	10	312	100.0	3.6	120.5	202.6	5.8	80.8	135.9	12.8	22.1	42.0	-	223.4	380.5	18.6	-
227B	12	311	100.0	9.9	187.8	249.5	17.7	73.6	97.1	9.6	19.3	27.3	3.9	280.7	373.9	27.3	3.9
North Dakota																	
225B	6	211	85.1	19.3	128.0	125.1	20.8	163.0	184.8	13.7	21.3	22.8	10.2	312.3	332.7	34.5	10.0
173	24	1126	100.0	10.7	111.2	164.5	10.0	113.6	169.6	15.6	23.4	32.1	6.8	248.2	366.2	25.6	6.8
174A	13	944	100.0	22.5	145.0	240.7	1.7	138.4	163.4	19.4	53.7	67.1	16.1	337.1	471.2	21.1	16.1
168	27	1907	82.5	4.2	110.4	209.5	.6	43.6	64.7	5.5	9.8	19.1	-	163.8	293.3	6.1	-
169	13	525	86.8	10.2	122.7	231.6	1.0	116.4	162.3	12.6	26.5	35.0	7.8	265.6	428.9	13.6	7.8
172	10	355	28.4	4.5	107.9	214.6	7.3	72.4	103.1	12.7	18.3	32.1	.6	198.6	349.8	20.0	.6
170	4	94	20.5	13.4	122.3	222.3	-	202.1	342.6	16.0	26.6	53.2	-	351.0	618.1	16.0	-
171	5	165	10.5	16.0	109.1	233.9	-	135.2	193.9	22.4	38.2	43.6	7.3	282.5	471.4	22.4	7.3
136	14	391	58.9	9.0	110.5	193.4	7.2	86.4	118.7	12.8	22.0	28.1	7.4	218.9	340.2	20.0	7.4
139	1	30	19.4	5.0	120.0	240.0	-	80.0	120.0	10.0	20.0	-	20.0	220.0	360.0	10.0	20.0
166	14	772	100.0	31.5	136.9	198.4	5.8	169.3	256.5	22.2	45.8	38.3	11.9	352.0	493.2	28.0	11.9
South Dakota																	
181	23	1114	94.9	30.1	128.1	197.8	12.3	168.0	281.0	19.5	54.7	96.6	1.9	350.8	575.4	31.8	1.9
182A	17	605	100.0	30.0	156.4	229.4	4.1	209.6	309.1	25.8	76.7	135.5	2.5	442.7	674.0	29.9	2.5
174B	27	2493	97.5	21.0	113.5	155.1	12.4	169.9	263.5	20.6	73.7	138.3	3.5	357.1	556.9	33.0	3.5
180	21	826	100.0	25.6	103.0	163.6	11.0	246.8	372.2	30.7	48.2	68.2	9.7	398.0	604.0	41.7	9.7
176	31	2259	67.1	25.9	91.7	39.8	27.8	198.7	312.9	27.7	55.7	97.8	7.0	346.1	449.6	55.5	7.0
179	6	355	39.9	22.7	79.2	13.5	36.3	192.7	286.2	26.8	47.3	72.1	11.3	319.2	371.8	63.1	11.3
182B	18	1257	81.2	21.3	127.8	94.2	23.0	245.4	371.7	29.0	115.8	126.2	36.9	489.0	592.1	52.0	36.9
175	6	255	24.6	28.8	121.6	67.4	19.6	156.5	258.0	15.3	36.1	17.2	27.4	314.2	342.6	34.9	27.4
142A&177	6	266	65.5	25.2	122.2	105.3	18.0	194.0	293.2	24.1	55.6	58.6	7.6	371.8	457.1	42.1	7.6
Nebraska:																	
184	13	709	41.5	17.5	112.0	92.5	19.2	191.8	303.0	23.3	56.7	68.8	17.5	360.5	464.3	42.5	17.5
185	3	720	52.1	15.8	128.5	83.3	21.4	175.0	280.0	17.5	35.0	1.9	30.4	338.5	365.2	38.9	30.4
Montana																	
137A	11	297	78.8	15.8	117.2	234.3	-	213.8	324.6	27.6	49.8	95.6	3.4	380.8	654.5	27.6	3.4
118	4	77	61.6	9.7	222.1	402.6	-	79.2	72.7	9.1	10.4	2.6	9.1	311.7	477.9	9.1	9.1
113	2	27	6.6	15.2	277.8	333.3	18.5	318.5	74.1	11.1	59.3	-	59.3	655.6	407.4	29.5	59.3
114	6	157	50.3	23.7	128.7	247.1	-	156.7	244.6	24.2	43.3	42.0	19.8	328.7	533.7	24.2	19.8
116	3	48	100.0	23.5	125.0	225.0	-	362.5	575.0	33.3	54.2	108.3	-	541.7	908.3	33.3	-
87D	4	59	100.0	34.6	228.8	322.0	-	654.2	962.7	78.0	186.4	362.7	5.1	1069.4	1647.4	78.0	5.1
88A	3	26	81.2	13.9	200.0	400.0	-	269.2	307.7	26.9	42.3	69.2	-	511.5	776.9	26.9	-
120	1	40	100.0	15.0	135.0	202.5	-	125.0	200.0	25.0	50.0	50.0	25.0	310.0	452.5	25.0	25.0
Total or average	417	21,216	69.7	19.0	120.2	161.2	12.0	158.2	240.3	19.5	48.6	72.2	9.3	327.0	473.7	31.5	9.3

Table 52. - Labor and power used per 100 acres in harvesting, threshing and hauling flax where cut with a binder and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of flax cut with binder	Proportion of flax acreage cut with binder	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota																	
225A	21	712	81.2	7.1	132.0	193.3	10.1	178.9	294.4	18.5	44.1	76.1	6.2	355.0	563.8	28.6	6.2
226	10	227	100.0	5.8	123.8	167.4	13.2	163.0	264.3	26.4	41.4	60.8	11.0	328.2	492.5	39.6	11.0
225D	6	265	100.0	3.8	105.7	226.4	-	94.0	117.7	9.8	33.2	64.2	1.1	232.9	408.3	9.8	1.1
227A	3	44	100.0	2.4	159.1	100.0	27.3	40.9	68.2	6.8	13.6	27.3	-	213.6	195.5	34.1	-
227B	12	302	100.0	3.4	120.9	213.2	13.6	93.0	151.7	11.6	25.2	32.4	5.6	239.1	397.3	25.2	5.6
North Dakota																	
225B	3	150	53.6	4.7	130.7	101.3	20.0	134.0	162.7	10.0	20.7	12.7	14.0	285.4	276.7	30.0	14.0
173	3	70	58.4	3.0	50.0	200.0	-	194.3	268.6	10.0	21.4	42.9	-	265.7	511.5	10.0	-
174A	5	370	84.1	8.1	120.8	182.7	6.0	97.6	177.8	8.9	16.8	51.9	1.6	235.2	412.4	14.9	1.6
168	5	210	82.4	2.3	80.0	104.8	8.6	72.4	103.8	8.6	9.5	19.0	-	161.9	227.6	17.2	-
169	3	55	29.7	4.0	145.4	290.9	-	150.9	174.6	14.6	38.2	76.4	-	334.5	541.9	14.6	-
172	1	60	43.5	1.0	90.0	-	45.0	66.7	100.0	16.7	33.3	33.3	-	190.0	133.3	61.7	-
170	1	25	25.3	1.6	96.0	192.0	-	40.0	64.0	8.0	8.0	16.0	-	144.0	272.0	8.0	-
136	2	125	65.8	3.5	96.0	70.4	30.4	77.6	124.8	10.4	24.0	-	14.4	197.6	195.2	40.8	14.4
139	1	22	100.0	2.2	113.6	272.7	-	72.7	109.1	9.1	4.6	9.1	-	190.9	390.9	9.1	-
166	4	109	78.4	9.0	148.6	212.8	9.2	85.3	137.6	13.8	27.5	51.4	-	261.4	401.8	23.0	-
South Dakota																	
181	11	614	80.4	10.8	124.8	154.7	24.3	121.7	214.7	14.8	58.5	102.6	6.4	305.0	472.0	39.1	6.4
174B	3	85	68.0	8.0	89.4	141.2	23.5	223.5	230.6	31.8	40.0	58.8	4.7	352.9	430.6	55.3	4.7
Montana																	
137A	2	35	46.7	5.0	171.4	342.9	-	320.0	480.0	40.0	91.4	125.7	28.6	582.8	948.6	40.0	28.6
119B	1	65	20.2	.2	127.7	375.4	-	23.1	-	4.6	4.6	9.2	-	155.4	384.6	4.6	-
113	1	42	20.3	.7	81.0	-	33.3	19.0	-	19.0	7.1	-	7.1	107.1	-	52.3	7.1
114	2	39	28.5	7.4	261.5	61.5	76.9	246.2	318.0	23.1	12.8	5.1	10.3	520.5	384.6	100.0	10.3
Total or average	100	3,626	67.5	6.2	120.5	173.1	14.2	125.4	196.2	14.6	34.4	57.8	5.4	280.3	427.1	28.8	5.4

Table 53. - Labor and power used per 100 acres in harvesting, threshing, and hauling wheat where cut with a header and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of wheat cut with header	Proportion of wheat acreage cut with header	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
North Dakota																	
172	36	6,669	85.8	3.3	162.5	292.5	7.8	32.2	.3	6.6	18.5	30.7	2.8	213.2	323.5	14.4	2.8
170	25	3,156	88.7	5.1	188.3	34.3	23.8	52.8	-	11.2	23.1	38.3	4.3	264.2	72.6	35.0	4.3
171	33	6,784	52.9	5.4	175.2	328.9	.7	45.2	.4	9.2	28.3	43.9	5.6	248.7	373.2	9.9	5.6
136	3	760	4.5	3.8	105.1	192.9	17.5	36.2	-	7.2	9.9	6.3	6.7	151.2	199.2	24.7	6.7
166	7	842	14.5	3.7	137.9	231.4	11.5	30.8	-	6.4	17.0	24.9	4.5	185.7	256.3	17.9	4.5
South Dakota																	
174B	1	200	4.4	12.0	134.0	335.0	-	50.0	-	10.0	41.5	40.0	21.5	225.5	375.0	10.0	21.5
176	13	2,255	26.8	13.0	118.8	165.2	23.2	85.1	16.8	17.7	41.1	69.4	13.1	245.0	251.4	40.9	13.1
175	8	2,247	28.7	12.9	190.8	333.2	7.3	84.6	-	16.2	58.6	84.6	11.8	334.0	417.8	23.5	11.8
142A and 177	1	80	1.8	12.0	250.0	400.0	-	75.0	-	12.5	17.5	25.0	5.0	342.5	425.0	12.5	5.0
Nebraska																	
184	4	330	7.1	2.1	159.1	298.8	-	62.7	-	14.2	14.2	28.5	-	236.0	327.3	14.2	-
Montana																	
137A	6	735	14.8	5.3	176.4	349.3	-	68.2	-	12.0	31.2	22.7	22.7	275.8	372.0	12.0	22.7
119B	9	2,693	28.7	4.8	123.9	162.2	14.8	52.8	-	8.5	16.5	5.6	13.7	193.2	167.8	23.3	13.7
118	2	200	6.3	1.0	200.0	400.0	-	42.0	-	7.0	7.0	-	7.0	249.0	400.0	7.0	7.0
113	6	3,015	17.3	5.1	170.2	291.7	7.3	36.0	-	8.9	17.8	15.5	11.0	224.0	307.2	16.2	11.0
116	2	165	1.4	3.7	151.5	303.0	-	36.4	-	6.1	6.1	12.1	-	194.0	315.1	6.1	-
87D	3	580	32.8	8.4	249.3	435.5	-	50.5	-	21.6	50.5	83.8	8.6	350.3	519.3	21.6	8.6
120	6	500	9.6	3.9	235.0	413.2	-	66.2	-	12.2	19.4	39.6	.6	320.6	452.8	12.2	.6
Total or average	165	31,211	13.5	5.9	165.4	259.9	9.2	49.3	1.4	10.1	26.0	37.3	7.5	240.7	298.6	19.3	7.5

Table 54.-Labor and power used per 100 acres in harvesting, threshing, and hauling oats where cut with a header and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of oats cut with header	Proportion of oats acreage cut with header	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
North Dakota																	
172	8	220	46.0	4.3	143.2	295.4	4.1	70.9	-	13.6	22.7	35.4	4.6	236.8	330.8	17.7	4.6
170	8	175	30.3	6.8	173.1	281.1	8.0	69.1	-	15.4	12.6	17.1	5.7	254.8	298.2	23.4	5.7
171	8	388	82.2	6.4	189.7	379.4	-	46.1	-	8.8	13.9	16.0	5.9	249.7	395.4	8.8	5.9
South Dakota																	
175	1	30	3.8	30.0	50.0	200.0	-	300.0	100.0	33.3	66.8	133.3	-	416.8	433.3	33.3	-
Nebraska																	
184	1	60	7.4	40.0	200.0	400.0	-	225.0	-	45.0	201.7	270.0	66.7	626.7	670.0	45.0	66.7
Montana																	
137A	1	35	8.0	8.0	171.4	342.9	-	51.4	-	8.6	17.1	-	17.1	239.9	342.9	8.6	17.1
Total or average	27	908	3.5	9.0	170.6	334.1	2.5	76.9	3.3	14.4	30.1	41.0	9.8	277.6	378.4	16.9	9.8

Table 55.-Labor and power used per 100 acres in harvesting, threshing, and hauling barley where cut with a header and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of barley cut with header	Proportion of barley acreage cut with header	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
North Dakota																	
169	1	80	13.2	9.0	108.8	217.5	-	75.0	120.0	7.5	15.0	30.0	-	198.8	367.5	7.5	-
172	20	872	69.6	3.6	176.3	333.5	4.1	44.2	-	9.1	15.4	27.6	.9	235.9	361.1	13.2	.9
170	13	364	79.5	7.2	178.8	312.1	3.3	51.4	-	9.6	15.7	27.8	1.6	245.9	339.9	12.9	1.6
171	21	1034	65.9	7.7	178.5	348.2	1.3	62.8	-	13.2	28.9	25.5	9.7	270.2	373.7	14.5	9.7
South Dakota																	
176	5	454	13.5	25.3	182.2	265.2	20.5	60.6	-	26.2	34.6	59.0	5.1	277.4	324.2	46.7	5.1
175	6	343	33.0	28.8	276.4	523.6	-	195.6	114.3	24.8	65.3	115.4	2.0	537.3	753.3	24.8	2.0
Nebraska																	
184	2	65	3.8	30.0	203.1	406.2	-	215.4	-	49.2	86.2	172.3	-	504.7	578.5	49.2	-
Montana																	
113	5	265	64.3	11.3	181.9	295.1	15.1	84.9	-	15.8	14.7	11.3	7.6	281.5	306.4	30.9	7.6
Total or average	73	3477	11.4	11.7	187.2	341.2	5.6	74.6	14.0	15.4	28.1	41.3	4.7	289.9	396.5	21.0	4.7

Table 56.-Labor and power used per 100 acres in harvesting, threshing, and hauling flax where cut with a header and threshed in a stationary separator, by type-of-farming areas, Northern Great Plains

State and type-of-farming area	Reports	Acreage of flax cut with header	Proportion of flax acreage cut with header	Yield per harvested acre	Harvesting			Threshing			Hauling			Total			
					Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acres	Percent	Bushels	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
North Dakota:																	
169	1	130	70.3	4.0	99.2	198.5	-	84.6	135.4	8.5	27.7	33.8	5.4	211.5	367.7	8.5	5.4
172	3	78	56.5	2.3	112.8	184.6	12.8	71.8	30.8	15.4	20.5	41.0	-	205.1	256.4	28.2	-
170	4	74	74.7	3.4	236.5	491.9	-	73.0	81.1	16.2	16.2	18.9	6.8	325.7	591.9	16.2	6.8
171	1	15	100.0	2.0	200.0	533.3	-	80.0	-	13.3	13.3	26.6	-	293.3	559.9	13.3	-
South Dakota:																	
175	1	50	100.0	7.0	198.0	396.0	-	90.0	-	18.0	36.0	-	36.0	324.0	396.0	18.0	36.0
Montana																	
119B	2	67	20.8	1.9	116.4	209.0	17.9	65.7	-	11.9	9.0	11.9	3.0	191.1	220.9	29.8	3.0
Total or average	12	414	7.7	3.5	144.7	286.0	5.3	77.6	62.8	13.0	21.7	24.6	7.7	244.0	373.4	18.3	7.7

Table 57.-Summary of labor and power used per 100 acres in harvesting, threshing and hauling small grains and flax, Northern Great Plains

Crop	Reports	Acreage	Yield per harvested acre	Harvesting and Threshing			Hauling			Total			
				Man	Horse	Tractor	Man	Horse	Truck	Man	Horse	Tractor	Truck
	Number	Acree	Bushele	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Wheat	1171	231,548	8.8	149.3	169.0	27.0	40.2	38.3	19.7	189.5	207.3	27.0	19.7
Oats	598	25,666	22.7	274.5	405.5	29.4	41.5	62.6	8.2	316.0	468.1	29.4	8.2
Barley	580	30,429	18.0	236.7	320.6	30.8	46.8	63.4	12.2	283.5	384.0	30.8	12.2
Flax	132	5,374	5.8	201.2	276.4	30.5	32.1	46.4	8.8	233.3	322.8	30.5	8.8

Table 58. - Labor and power used per 100 acres in making hay by different methods, Northern Great Plains

Kind of hay	Method of cutting	Reports	Acreage	Proportion of hay acreage	Average yield per acre	Hours of labor and power per 100 acres			
						Man	Horse	Tractor	Truck
		Number	Acres	Percent	Tons	Hours	Hours	Hours	Hours
Prairie hay	Mower	273	24,708	49.4	.4	234.7	393.2	6.9	-
Grain hay	Mower	269	9,401	18.8	.5	295.2	493.2	1.5	-
do	Binder	57	2,168	4.4	.5	247.9	335.4	15.2	.9
do	Header	14	815	1.6	1.0	231.8	354.8	7.4	3.4
Alfalfa									
1 cutting	Mower	192	5,976	11.9	.7	352.0	545.3	6.6	1.2
2 cuttings	do	73	2,137	4.3	1.6	861.4	1,297.9	.9	-
3 cuttings	do	8	213	.4	1.9	969.0	1,682.5	-	-
Sweet clover	Mower	79	2,494	5.0	1.0	453.5	644.5	1.3	-
do	Binder	6	190	.4	1.1	323.2	494.7	5.3	-
Millet	Mower	66	1,110	2.2	1.1	422.6	634.3	-	-
do	Binder	8	97	.2	1.0	330.7	517.3	6.7	-
Timothy	Mower	10	427	.9	.8	364.2	564.4	-	-
Sudan	Mower	15	182	.3	.7	388.3	645.7	-	-
do	Binder	5	87	.2	1.1	348.3	333.3	28.7	-